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OF THE

OHIO ACADEMY OF SCIENCE

Forty-fifth Meeting

1935

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Affiliated with the American Association for the Advancement of Science

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REPORT OF THE FORTY-FIFTH ANNUAL MEETING OF THE OHIO ACADEMY OF SCIENCE

WILLIAM H. ALEXANDER,
Secretary

Introductory

The Forty-fifth Annual Meeting of The Ohio Academy of Science was held at the Ohio State University, Columbus, on Friday and Saturday, April 19 and 20, 1935, under the Presidency of Dr. James P. Porter, of Ohio University, Athens. The campus, the numerous buildings, the excellent equipment, and the generous hospitality of the entertaining institution are well known to most if not all members of the Academy; therefore little need be said along these lines. As on each of the preceding twenty-six occasions when the Academy held its annual meeting at this familiar place the welcoming spirit of the "powers that be" was impressively sincere and generous and the provisions for the needs of every meeting notably ample. The local committee on arrangements under the fine leadership of Dr. Guy-Harold Smith apparently left nothing undone for the welfare of those in attendance.

About 200 members and a large number of visitors were in attendance upon the various meetings, general and sectional, and the annual dinner on Friday night was well attended. Dr. Guy-Harold Smith, chairman of the local committee on arrangements, acted as toastmaster at the dinner, introducing the guests of honor and the speakers of the evening in a most happy manner. President Rightmire, of Ohio State University, extended the cordial greetings of the university, pointing out at the same time in a very impressive way the great service already rendered by Science to humanity, the marvelous services now being rendered and some of the great problems yet to be solved by Science. His was a very forwarding looking address.

The physical and mental setting now seemed excellent for the Presidential Address on "*Our Sciences With Man Left In*," and the President, Dr. James P. Porter, of Ohio University, in one of his happiest moods, delivered in a most impressive manner the fine address printed elsewhere in these Proceedings. Then followed a most delightful social, get-acquainted hour

in the spacious lounge rooms of the Faculty Club, the final verdict apparently being that "it was good to be there."

Among the outstanding features of the program may be mentioned the invitation address, beautifully illustrated, on "The Canons of the Green, and Colorado Rivers," by Mr. Julius F. Stone, of Columbus; a discussion of "Bobwhite: Song Bird or Game Bird," by Dr. S. Prentiss Baldwin, of the Baldwin Research Laboratory, Gates Mills; a brief discussion of the scientific and technical problems involved in the investigation of the explosion of the State Office Building, by Dr. James R. Withrow, of Ohio State University; a joint meeting of the Section of Psychology and The Ohio Association of Consulting Psychologists, and a Symposium on Chemistry in Biology under the joint auspices of the sections of Botany and Chemistry.

Minutes of the Business Sessions

(Stenographically reported by Wm. H. Howard, Shorthand Instructor, Franklin University, Columbus, Ohio)

First Session: April 19, 1935

The business session was called to order at 9:30 A. M. by the President, Dr. James P. Porter, of Ohio University, in the auditorium of the State Historical and Archaeological Building, Ohio State University, Columbus, Ohio, with thirty in attendance which gradually increased to sixty during the session.

President Porter: The meeting will please come to order. Before proceeding with the business of the morning, I wish to announce that copies of the First and Second Biennial Reports of the State Water Conservation Board are available at the Registrar's table.

At this time I want to make the announcement of the appointment of certain Committees:

The Committee on Necrology—Dr. Willard Berry, of Ohio State University, and Dr. W. H. Shideler, of Miami University. In this connection I want to ask the members to give the names of any who have passed away among our membership, to the gentlemen of this Committee. We have the names of Dr. Wm. A. P. Graham and Dr. James T. Daley.

The Committee on Membership—Dr. W. H. Camp, Dr. Chas. W. Jarvis, and Dr. Wilber E. Stout.

The Committee on Resolutions—Dr. A. W. Lindsay, Dr. F. C. Waite, and Dr. L. B. Nice.

We will now have the report of the Secretary, Mr. Wm. H. Alexander.

The report was read.

PRESIDENT PORTER: You have heard the report of the Secretary; what action do you wish to take?

Motion to accept the report was adopted.

PRESIDENT PORTER: We will now have the report of the Treasurer, Dr. Waller.

DR. A. E. WALLER (After reading report): There are several items I would like to call attention to. The account has been audited and this report is included in the Auditor's report and accepted by the Executive Committee last evening. It was quite evident last year that we were running short; that our shortage was taken care of by the following year's income. Of course, we know we can't proceed forever on that basis. We might be able to do one of several things. We might be able to increase our dues, increase our membership, or reduce our expenses. It is evident right now that our expenses are going higher than our income. While we can carry that for a while, we cannot do so indefinitely.

While the report shows a balance of $594.64 at the beginning of the year, there were outstanding bills of $535.46, leaving in reality a balance of only $59 in the treasury. Consequently, with that in mind, I have asked for some suggestions. The only recommendation we can give is to increase the dues, increase the membership or reduce expenses. We cannot increase the dues. We do believe we can increase the membership; and I believe we can reduce our expenses.

The main item of expense is the printing of the proceedings of our meetings, which I do not believe any one ever reads. We can have them received and authorize the Secretary to preserve them on file available for any one's inspection. I do not believe we actually need to go to print with the proceedings. That would save us about $200. If we could limit the number of pages, we could save something on postage. We have a little variation in the accounts of the Vice-Presidents. Perhaps we could bring those together and put them on the same basis.

While our treasury is intact and we are able to meet our bills, we are doing it with money that is really collectible for

the current year, and still used for the expenses of the previous year, so that is not a very sound condition.

PRESIDENT PORTER: What action do you wish to take on the report?

Motion prevailed to accept and file the report.

PRESIDENT PORTER: The next item of business is election, by ballot, of a Nominating Committee for the coming year, one member from each section, their report to be received at the meeting in 1936.

MR. ALEXANDER: The last few meetings it has been customary just to elect the present Vice-Presidents for the Nominating Committee for the next year. The Secretary has been instructed to cast a ballot for these eight persons. There is no law on this point other than that the ballot is to be in writing.

Motion prevailed instructing the Secretary to cast a ballot for the present Vice-Presidents as the Nominating Committee for 1936.

MR. ALEXANDER: I take pleasure in casting the written vote of the Academy for the following persons as the Nominating Committee for 1936:

ROBERT S. MCEWEN, Oberlin College, Oberlin, Ohio.
ONDESS L. INMAN, Antioch College, Yellow Springs, Ohio.
WILLARD BERRY, Ohio State University, Columbus, Ohio.
J. B. BROWN, Ohio State University, Columbus, Ohio.
FRANCIS N. MAXFIELD, Ohio State University, Columbus, Ohio.
C. E. HOWE, Oberlin College, Oberlin, Ohio.
G. W. CONREY, Ohio Agricultural Exp. Station, Wooster, Ohio.
CLYDE S. ADAMS, Antioch College, Yellow Springs, Ohio.

PRESIDENT PORTER: Are there any items of new business to be brought before the Academy at this time? If not, we shall proceed to Item No. 6, reports on standing committees. We will have the report of the Executive Committee by the Secretary.

Report was read.

PRESIDENT PORTER: You have heard the report of the Executive Committee; what action do you desire to take?

Motion prevailed to accept and file the report.

PRESIDENT PORTER: The next will be the report of the Publications Committee, by Dr. F. H. Krecker, Chairman.

Dr. Krecker made a brief oral statement and promised a complete written report later to be filed with the Secretary. (See page 268.)

PRESIDENT PORTER: This report is before you; what action do you wish to take on the recommendation of the Committee?

Motion was offered to accept the report.

PRESIDENT PORTER: Does this motion refer to both items or the last? I am not clear as to that.

DR. KRECKER: It refers to Article 14 of the Constitution.

PRESIDENT PORTER: That would go over one year.

Motion to accept the report was adopted.

PRESIDENT PORTER: Dr. Krecker.

DR. KRECKER: This coming year the Committee will see to it that the members of the Administrative Board are included on the Publications Committee, otherwise it could be allowed to go as it is for the coming year.

DR. NEALE F. HOWARD: Is it possible to increase the number of Academy members to the same number of members now on the Committee?

MR. ALEXANDER: To change the number on the Joint Administrative Board is not a constitutional change, but if you reduce the number of members on the Publications Committee, that is a constitutional change. The former could be done without delay; the latter requires a year's notice.

A MEMBER: What does that do to the first suggestion he made with reference to the funds?

PRESIDENT PORTER: That no change will be made at present; that is correct, Dr. Krecker?

DR. KRECKER: Yes, sir.

PRESIDENT PORTER: The next item is the report from the Chairman of the Trustees of the Research Funds, Dr. Herbert Osborn.

In the absence of Dr. Osborn, Mr. Alexander read the report signed by Dr. Alpheus W. Smith and Dr. Herbert Osborn.

PRESIDENT PORTER: What do you wish to do with the report?

Motion prevailed to accept the report.

PRESIDENT PORTER: We shall now listen to the report of the Library Committee, Mrs. Ethel M. Miller, Secretary.

Mrs. Miller read her report and commented on some of the items.

PRESIDENT PORTER: What action do you desire to take on the report?

Motion prevailed to accept the report.

PRESIDENT PORTER: We will now hear the report of the

Committee on State Parks and Conservation, by Dr. Edward S. Thomas.

Dr. Thomas read his report and closed by saying: "I am very glad to announce that steps have been taken to have a trained research worker stationed at these areas particularly to study the relationship between these sanctuaries for the protection of wild life. There are more hunters in the field in recent years and have reduced the game 50% among our formerly abundant species, which have become as scarce now as the less abundant species."

PRESIDENT PORTER: What action shall we take on the report?

Motion to accept the report was seconded.

DR. KRECKER: I am just wondering what provision there is for association or relationship between the Committee and the higher administrative officers of the State. The thing which makes me ask that question is, during the primary campaign for governor one candidate made the statement he would consult the sportsmen and various people on conservation relative to natural, scientific methods. I have been wondering how much opportunity there has been for impressing our views on conservation upon our state officials. Personally, I would like to see some such channel established. *I would like to suggest that we empower the Conservation Committee to draw up resolutions including the suggestions made by the Committee and send to the Governor, so those in high position will know what we believe.*

PRESIDENT PORTER: *Do you wish to make that as a motion?*

DR. KRECKER: *Yes.* I am wondering also if we should adopt the Committee's report about pest hunts. There are many crows in the northwest part of the State. We would hesitate to condemn those hunts. We have had roosts of crows in the neighborhood of Bowling Green of 25,000 to 30,000 crows. There is one in Henry County also. The only way to exterminate them is through pest hunts to reduce their numbers very materially. Those crows make a very heavy toll on the products of the farm—watermelons, chickens and other products. While it is true some useful hawks are killed, I don't think the number is very large.

DR. THOMAS: The Committee does not refer to crow hunts. However, we are bitterly opposed to organized pest hunts. I think data will show that large numbers of beneficial hawks

and song birds are killed, when raiding starling roosts and crow roosts that do not come under the head of general pest hunts. I do not think our resolution would conflict. However, I do question the value to farmers in this state of raiding these crow roosts. These hunts are usually put on in the winter time. I do not think that would relieve the farmers in the summer time. There have been thousands of dollars spent in destroying European starlings. The birds that are in Ohio during the winter months do not remain here through the summer. The starlings we get in the big raids in northeastern Ohio and New York State go back to Ontario during the summer.

PRESIDENT PORTER: Dr. Krecker's *motion to empower the Conservation Committee to draw up resolutions including suggestions made by the Committee and send to the Governor so those in high position will know what we believe,* has been seconded, are you ready for the question?

Motion was carried.

PRESIDENT PORTER: That closes the business session this morning, unless there is something else you desire to consider.

DR. KRECKER: There is still a motion to approve the Committee's report.

PRESIDENT PORTER: That is right, are you ready for the original motion?

Motion carried.

PRESIDENT PORTER: Is Dr. Guy-Harold Smith in the room? We will have an announcement from him later.

The meeting stood adjourned.

Second Session: April 20, 1935

The meeting was called to order at 8:30 A. M. in Room 100, Chemistry Building.

PRESIDENT PORTER: The business meeting will please come to order. The first item of business this morning is the Reports of Special Committees. We will now have the report of the Committee on Election of Fellows, by the Secretary.

Mr. Alexander read the report containing the names of nine who had been elected to Fellowship in the Academy and announced, "It is customary to present each one elected a Fellow with a certificate. These certificates have been duly prepared and signed by the President and Secretary and if any one whose name I called is here, I shall be glad to hand the certificate to him."

MR. ALEXANDER: There is another point, while I am talking, I would like to speak of. Under the Constitution, nominations for Fellowships must be made on a printed form prescribed by the Academy. Occasionally a letter is received suggesting certain persons for Fellows. That is too informal for the Committee to act on. That is why we ask for the names to be put on the prescribed form in order to give the desired information. Remember the mere suggesting of a name for fellowship does not formally nominate. Let us not neglect to attend to this in the formal way. There are many members in our Academy who ought to be Fellows. We cannot use them as officers until they are Fellows. We are losing a lot of excellent talent from our official family because of neglect at this point; we are anxious, therefore, to increase the number of Fellows and thereby increase the available talent for officers and committees.

PRESIDENT PORTER: You have heard the report of the Secretary; what will you do with it?

Motion prevailed to accept the report.

PRESIDENT PORTER: The report of the Committee on Membership will be given by the Secretary.

MR. ALEXANDER: The names of the applicants appear on the blackboard, 22 in all, and all have paid their dues.

PRESIDENT PORTER: These have been approved by the Executive Committee and are now recommended for election to membership in the Academy.

A motion prevailed electing them to membership.

PRESIDENT PORTER: The report of the Committee on Necrology is next; is the chairman of that committee here?

The Committee was given permission to file report later with the Secretary.

PRESIDENT PORTER: The report of the Joint Administrative Board, the Ohio Journal of Science is next. Dr. Rice is coming into the room, so we will pass by this item for the moment. I don't see Dr. Waller who is to report for Save Outdoor Ohio Council.

MR. ROSCOE W. FRANKS: I would rather Dr. Waller would make the report. The Academy voted to withhold paying dues until a satisfactory reorganization of the Council was effected. That reorganization has been made. Mrs. Nora Halter, of Fremont, Ohio, was elected president. There will be a board of directors to determine the policy of the organiza-

tion and to lead the organization. Dr. Raymond C. Osburn, Dr. Wilber Stout, and Mr. Edmund Secrest are on the Forestry Committee. Mr. E. L. Wickliff has charge of scientific research, and Mr. T. H. Langolois is looking after surface water utilization. We have twelve men of that type to take care of the policy of Save Outdoor Ohio Council. I think it would be Mr. Waller's suggestion that the Academy go along this year as a member of Save Outdoor Ohio Council. The Grange has recently come in. We have the Baldwin Research Laboratories, of Gates Mills, Ohio, who volunteered to pay their dues as a member of the organization.

The main thing about the organization as it is now established seems to be a spirit of co-operation and a desire to get together and work out a conservation program. There is no question but that the office of the Conservation Commissioner will co-operate, so we are looking forward for some fine accomplishments in the next year or so.

PRESIDENT PORTER: Is there any action to be taken by the Academy on this report?

MR. FRANKS: Our dues are paid for this year. I don't think we need any action. I have the receipt for our dues.

Motion offered that the report be accepted.

MR. ALEXANDER: Do we have one or two representatives on the Council?

MR. FRANKS: We want to remodel our organization and then make the constitution fit it. The tentative set-up is one delegate, one voting delegate, with $8 dues, 3 delegates, $25. I have been appointed secretary of Save Outdoor Ohio Council and would like to see three members from the Academy of Science, as I feel they will have a real responsibility.

PRESIDENT PORTER: Any more questions. Who is the delegate at present?

MR. FRANKS: Dr. Waller.

PRESIDENT PORTER: Any other questions on this report? The Secretary suggests that we wait until Dr. Waller comes to see if he has anything else to add.

PRESIDENT PORTER: We will now go back to the report of the Joint Administrative Board. the Ohio Journal of Science, and hear from Dr. Bernard S. Meyer, Business Manager.

DR. MEYER: (Read the report.)

PRESIDENT PORTER: Is there any discussion of this report?

Motion prevailed to accept the report.

PRESIDENT PORTER: Dr. Waller has now come in, and we will hear from him on Save Outdoor Ohio Council.

DR. WALLER: Last year it was decided to withhold membership dues in the Save Outdoor Ohio Council pending reorganization. This year Mrs. McDonald called a meeting which resulted in such a reorganization. I might explain what the Save Outdoor Ohio Council is. It is made up of representatives from different associations interested in conservation. It is a council for educational and legislative work. During the first few years it was necessary for them to discover what conservation is and how it touches the lives of our people. It was largely a matter of interest on the part of Mrs. George McDonald, of Cincinnati, that the sportsmen and others came together to develop this council. She carried it on as an amateur. As time went on it was found necessary to have a better set-up. Mrs. McDonald was enthusiastic and did a splendid work, but she was not experienced in many of the phases presenting themselves, and consequently they did not always work out as expected. Two years ago the Academy of Science interested itself in the situation as a member organization.

(After reading the report of the Committee on Save Outdoor Ohio Council, Dr. Waller continued:)

It is interesting to see the progress shown by the Council, and it seems to me the Council is worthy of our support, consequently we have taken out one membership in the name of the Ohio Academy of Science. If you wish to send more representatives to the Council meetings, it is possible to do so. At present we have one. The President is Mrs. Nora Halter, of Fremont, and I am certain she will be glad to know that the Academy is interested in supporting the Council. It seems to me we have a number of Ohio Academy of Science members who do not feel it is in harmony with the Academy. We therefore feel that the Council should receive our support and so recommend.

PRESIDENT PORTER: The motion is ready to be voted on to accept the report of the committee.

Motion prevailed accepting the report.

PRESIDENT PORTER: Is there a member of the Committee on Resolutions present to report?

DR. F. C. WAITE: The chairman has not called a meeting of the Committee, but I personally wish to offer the following resolution:

"That the Ohio Academy of Science express its appreciation of the courtesy of the Ohio Archaeological and Historical Society and of Ohio State University and of the heads of various departments of the University for granting the use of rooms and other facilities during the 45th annual meeting of the Academy."

PRESIDENT PORTER: You have heard the resolution.

Motion prevailed to adopt the resolution.

PRESIDENT PORTER: The Secretary suggests that we ask for other resolutions, are there any? (No response.) Is there a member of the Committee on Necrology present now? We passed that report by awhile ago. (No response.)

MR. FRANKS: I have a resolution on pest hunts to offer:

WHEREAS, The emphasis in Pest Hunts is generally placed on predatory mammals, predatory birds and other valuable wild life, instead of upon the obnoxious rodents upon which the predators subsist to a great extent, and

WHEREAS, Information of a scientific character is largely lacking as to the numbers, habits, and economic relationships of predatory mammals in Ohio, and

WHEREAS, Predatory mammals are of value as fur, or as controls for pests, and vary in importance during different seasons and in different sections, and

WHEREAS, There is information of a scientific character sufficient to prove that more than 90 per cent of the predatory birds are of great value in controlling rodent pests, and

WHEREAS, Nineteen of our twenty-two species of predatory birds are now protected by law because of their value to agriculture and conservation; therefore

Be it Resolved, That the Ohio Academy of Science urges the State Division of Conservation to initiate a thorough scientific study of all predatory mammals in Ohio, to determine their distribution, abundance, rate of increase, and food species eaten at various seasons and in various sections, and their economic relationships in the several parts of the State.

Be it Further Resolved, (2) That the State Division of Conservation be encouraged to enforce the laws protecting the valuable birds of prey.

Be it Further Resolved, (3) That the Secretary of the Academy immediately bring this resolution to the attention of the proper persons.

PRESIDENT PORTER: Are there any questions you wish to raise concerning some of the "whereases"?

MR. FRANKS: This may not be stated as clearly as it might be. There are a good many people organizing pest hunts who think they are doing the proper thing. We have no quarrel with pest hunts when they include rats, mice or certain predatory birds. The section of this resolution regarding predatory mammals is similar to the resolution adopted in Michigan.

Dr. Krecker: I take it this carries out the resolution the Academy adopted yesterday. I should think no formal action is necessary.

Mr. Franks: I am satisfied an action of that kind will be satisfactory to the new Conservation Commissioner.

President Porter: Any further remarks?

Dr. Krecker: I am thoroughly in favor of the resolution as expressing the attitude of conservationists. The emphasis on pest hunts is always misplaced. They put emphasis largely on hawks and owls instead of putting it on crows and rats. They seem to be ignorant of the situation. I cannot see any objections to this resolution.

President Porter: The motion is on the adoption of Mr. Franks' resolution.

Motion prevailed adopting the resolution.

President Porter: Any member of the Committee on Necrology present? (No response.) In the absence of any member of the Committee, what action do you wish to take?

Dr. George D. Hubbard: I know that Dr. Berry is working on the matter. He is not here to make his report, but he is working on it.

President Porter: Would it be possible for us to vote an acceptance of the report being prepared?

Motion prevailed to accept the report being prepared by Dr. Berry, Chairman of the Committee on Necrology.

Dr. Hubbard: I am not sure that we know of all the deaths of the past year. I know of but one or two. The Secretary and Mrs. Miller might have a check on that. Older members who do not attend the Academy regularly might be overlooked.

President Porter: Confer with Mrs. Miller and the Secretary. I think we have now taken care of everything by way of Committee Reports except the Nominating Committee. Has Dr. Howard a report?

Dr. Howard: (Read his report, signed by all members of the Committee.)

President Porter: If I understand correctly, nominations from the floor are also in order.

No such nominations being offered, a motion prevailed to close the nominations.

A motion also prevailed accepting the report of the Nominating Committee.

PRESIDENT PORTER: The Secretary has just called my attention to a matter that comes very close to me, that Dr. James R. Patrick has not paid his dues. The Secretary suggests that this be left to the Executive Committee. This looks a little like *ex-post facto* business here. I am sure Dr. Patrick will insist that he wants no special favors in this matter. This will be left to the Executive Committee.

Motion prevailed approving the suggestion of the Secretary.

PRESIDENT PORTER: Are there any matters of unfinished business? The Secretary says if there is nothing else of unfinished business he has something on his mind.

MR. ALEXANDER: I realize we have but a few minutes left. There are two or three things I would like to have cleared up. At the last annual meeting and during the year more or less has been said about amendments to the Constitution and By-laws of this organization. As matters stand at the present moment, I do not know whether they have been passed, postponed, or rejected. At the last meeting the Chairman of the Library Committee called our attention to the fact that we had been paying money received from publications over to the Treasurer and said proceeds were being used for the general expenses of the Academy; that during the year she discovered that this money should be paid into the Research Fund; accordingly, the Chairman of the Committee very properly asked that the matter be cleared up.

On motion of Dr. Blake, a resolution was adopted to instruct the Committee to carry out the provisions of the Constitution on this subject, and to prepare and submit an amendment. This was done and a proposed amendment was included in the report of the Executive Committee (q. v.). (Mr. Alexander then read both the existing law and the proposed amendment.) The matter is now squarely up to you; do you or do you not wish to make a change? The Publications Committee seem to favor leaving the by-law as it is. The Executive Committee makes no recommendation.

DR. BLAKE: I think we should leave the matter as it is. We were on a Committee to prepare an amendment to the Constitution and By-laws and that was one of the paragraphs I have in mind. The older members will remember the McMillan Fund. After the death of Mr. McMillan, that was increased and we should do everything we can to keep this for the Research Fund.

Dr. Krecker: The Publications Committee had their attention called to this matter by the Secretary not so very long ago. I wrote to the other two members of the Publications Committee and heard from one member, but didn't hear from the other. We didn't get together, but at any rate two of the Committee, myself and one other member, felt the Constitution should remain as it is. I happened to be the only member of the Publications Committee who met with the Executive Committee, and that was the first intimation I had that the change was proposed. Yesterday in my report to the Academy I suggested that as far as the Committee was concerned the matter be deferred one more year. Therefore, I think this action is rather out of place. In any case, I would like for you to agree with the suggestion that the matter be left as it is.

President Porter: Any further discussion?

————: May I say a word as I am the one not showing up at the Committee meeting? May I make that action of the Committee unanimous? It is my opinion that the matter should stand as it is for the present rather than to make a change.

Dr. Hubbard: I am sure if Professor Osborn were here he would have something to say. We should do what we can to maintain and increase our present Research Fund. The report showed a few dollars less than $2,000. We can't expect more than 4%. This fund is rather small and if anything can be done to increase the amount, we should do it. I am also in sympathy with the Secretary who would like to have it put in Constitutional form. Let it go back to the Committee laboring on it to put it in form for our Constitution.

President Porter: Is there any further discussion? There being no motion, we will pass to other unfinished business.

Mr. Alexander: The question of a constitutional change, then, Mr. President, is referred back to the two Committees?

President Porter: The Chair so rules.

Dr. Waite: Five years hence we will reach our fiftieth meeting. In view of that fact, I think it should be suggested to the Executive Committee in taking up the meeting places of the Academy, that they should consider what we are going to do the next five years. We don't want it here when the A. A. A. S. comes here. Normally that fiftieth meeting ought to be here. For the preparation of the fiftieth meeting, there will be many things to be done. There ought to be a history written up of the Society at that time. Certainly the Societies

of other neighboring states should be invited at that time, and I think we should have national representatives. A fifty-year record of a Scientific Society should mean something.

PRESIDENT PORTER: Are there any remarks on this interesting suggestion from Dr. Waite? (No response.)

MR. ALEXANDER: I want these things straightened up. Now at the suggestion of our Treasurer, the Executive Committee prepared an amendment to the By-laws. This amendment is referred to you for such action as may seem wise. It is an amendment only in the sense that it is an addition.

(Mr. Alexander read the present provision and the proposed amendment.)

Now that is a new section and offered as Chapter 2 in the By-laws. I would like to have this acted upon.

PRESIDENT PORTER: Any questions?

MR. ALEXANDER: The Treasurer is here and can explain.

DR. WALLER: Each section might have its own meeting and would not have to call on the entire Academy to pay its expenses.

DR. J. P. VISSCHER: Probably the principle is very good, but I don't think they will work. In the case of the Geologists' excursion each spring, we need to look up and see who are interested, but certainly we could not ask the people who do not go to defray the expenses of the trip.

DR. WAITE: That plan would bring confusion. People would think they were paying their dues. In other words, in addition to the usual dues they would be solicited for this and then they would say, "I have paid my dues."

DR. WALLER: It would be a thing that each section would take care of as it wished. If the Section wanted a spring meeting, it would look to the members of its own section.

DR. CARMAN: Is that to be levied on all Sections?

DR. WALLER: They would have to decide separately what they wanted to do. The ones going on a field trip would naturally pay.

Motion by Dr. Waite that the amendment be disapproved prevailed.

MR. ALEXANDER: I want to ask that the Committees get together as far as possible and choose their chairmen. When a committee fails to designate a chairman, some one, usually the Secretary, has to do so. Would it not be more satisfactory for each Committee to choose its own chairman?

I desire to announce that the Research Committee's report has been signed by all of the members. The selection of the next meeting place and the fixing of the date should, according to custom, be left to the Executive Committee.

Dr. H. B. English: During the spring there is usually a congestion of meetings, I presume, because of the closeness of the A. A. A. S. at Christmas time. I do not wish to bring in an amendment, but I would like if it is possible for the Executive Committee of the Academy and the Executive Committee of College Associations to discuss whether one or the other should not meet in the fall while the other meets in the spring. There is about a 50% overlap. I should think the problem of transportation and things of that sort would be a very considerable one for people very far away. I suspect both meetings would gain in attendance and interest. I therefore suggest that the two Executive Committees of these two large Associations might consult as to whether we might meet at more widely different times.

Dr. H. H. M. Bowman: I desire to suggest that the Academy have its next meeting in Toledo in the fall or spring.

Dr. Ralph V. Bangham: We would like to have the Academy call at Wooster.

A motion prevailed leaving the matter of the next meeting in the hands of the Executive Committee.

President Porter: My last word is to thank you for your hearty co-operation, and to declare the meeting adjourned. (Applause.)

THE SCIENTIFIC SESSIONS

General and Sectional

The following is a list of the addresses and papers presented at the general and sectional meetings of the Academy as reported to the Secretary, viz.:

1. THE PRESIDENTIAL ADDRESS: Our Sciences With Man Left In, James P. Porter
2. THE INVITATION ADDRESS: The Canons of the Green and Colorado Rivers.....Julius F. Stone
3. Some Scientific and Technical Problems Met in Investigating the Explosion of the State Office Building.....James R. Withrow
4. Bobwhite: Song Bird or Game Bird?.....S. Prentiss Baldwin
5. The Address of Welcome.....President George W. Rightmire
6. The Effect of Temperature on a Mottled Eye.....T. C. Surrarrer
7. A Cross-over Modifier in *Drosophila hydei*.....Warren P. Spencer

8. Four Temperature-Responsive Mutations in *Drosophila funebris*, JAMES NEEL
9. Parasites of Wayne County (Ohio) Fish.....RALPH V. BANGHAM
10. *Daphnia magna* as a Biological Dosimeter for Soft X-rays, GEORGE G. SNIDER AND HAROLD J. KERSTEN
11. Time-Temperature Relationships in the Incubation of the Whitefish, *Coregonus clupeaformis* (Mitchell).....JOHN W. PRICE
12. Observations on the Development of the Kidney of the Oviparous Fish, *Trichopodus* (*Osphromenus*) *trichopterus*.....E. J. KAROLYI
13. Observations on the Anatomy and Differentiation of the Reproductive Ducts of the Turtle.....P. BURWASSER
14. Age as a Factor in the Storage of the Blow-fly Pupae.....J. G. HAUB
15. The Interconversion of Foodstuff during the Metamorphosis of the Blow-fly (*Phormia regina* Meig.):
    I. Respiratory Analysis.....F. A. HITCHCOCK
    II. Chemical Analysis.....J. G. HAUB
16. A Preliminary Report on Oviposition and Fertility in the Blow-fly (*Phormia regina* Meig.).....A. C. MILLER
17. Lake Level and the Fate of Ponds.....FREDERICK H. KRECKER
18. The Structural Relations of the Human Adrenal-autonomic Complex, D. P. QUIRING
19. The Agglutinogens M and N in New-born Infants.....HARRIET S. HYMAN
20. Growth in *Daphnia pulex*.....B. G. ANDERSON AND L. J. ZUPANCIC
21. Growth and Maturations in the Parthenogenetic Eggs of *Daphnia magna*.....H. LUMER
22. The Behavior of a Spider (*Phrurolithus formica*) in the Nests of the Ant (*Crematogaster lineolata*).....W. M. BARROWS
23. Protocalliphora (Diptera, Calliphoridae) Parasites of Nestling Birds, EDWARD S. THOMAS
24. Pairing in the Ostracod *Entocythere cambaria* Marshall, a Parasite found on Crayfish.....STEPHEN R. WILLIAMS
25. Fluctuations in Numbers of Mammals in a Beech-Maple Climax Community.....ARTHUR B. WILLIAMS
26. Some Observations on Adult Insects in Ohio during the Winter..W. C. STEHR
27. Studies of the Fresh-water Medusa.....MRS. A. G. LINSCHEID
28. Opportunities for Research at Franz Theodore Stone Laboratory, RAYMOND C. OSBURN
29. Distribution of Some of the 179 Species of Birds Known to Breed in Ohio.....LAWRENCE E. HICKS
30. A Summary of Research on the European Starling in Ohio, LAWRENCE E. HICKS
31. Factors Affecting the Amount of Reproduction in Passerine Birds, S. CHARLES KENDEIGH
32. The Systematic Status of Ohio Birds.....JOHN W. ALDRICH
33. Ten Years of Wild-Life Research in Ohio.....E. L. WICKLIFF
34. On the Microbiology of the Paper Liners of Containers of Peanut Butter and Other Foods.....O. T. WILSON
35. Algae of Some Ohio Soils.....ELIZABETH E. COYLE
36. Orthogenetic Series in Plants.....JOHN H. SCHAFFNER
37. The Cultivation of Digitalis for Glucosidal Content.....FRANKLIN J. BACON
38. Additions to the Revised Catalog of Ohio Vascular Plants, JOHN H. SCHAFFNER
39. The Present Status of Botany in the High Schools, PRESIDENT EDWIN E. JACOBS
40. The Vegetation and Dynamics of a Beech-Maple Climax Community, ARTHUR B. WILLIAMS
41. The Annual Increase of Phloem in Some Perennial Conifer Leaves, GLENN W. BLADES
42. Effect of Titanous Chloride on the Formation of Chlorophyll in Zea mays, O. L. INMAN
43. Selective Adaptation to Supports of Twining Vines.....H. H. M. BOWMAN
44. The Gastropods of the Hamden Limestone of the Lisbon (Ohio) Quadrangle.....MYRON T. STURGEON

45. Charaphyta and Conodonts from Columbus-Delaware Contact, Willard Berry
46. Additions to the Bighorn Fauna.....W. H. Shideler
47. Vance Well.....Wilbur Stout
48. Bitumin Bearing Concretions from the Ohio Shale of the Bellefontaine Outlier.....B. C. Freeman
49. Outline of the Section of Geology Spring Field Trip.....Willard Berry
50. Correlations among the Lower Mississippian Formations of Indiana, Kentucky, and Ohio.....P. B. Stockdale
51. The Role of Solution in the Reduction of Interstream Areas, Frank J. Wright
52. Notes on Insoluble Residues of some Conemaugh Limestones, Robert H. Mitchell
53. Practicability of Rotary Drilling in the Eastern Oil and Gas Fields of the United States.....Edward V. O'Rourke
54. Lacustrine Deposits near Indian Lake in Logan County, Ohio, G. W. Conrey
55. Some Structural Features of the Appalachian Valley in Virginia, Arthur Bevan
56. The Daily Rate of Growth of Nails.....Linden F. Edwards
57. Determination of the Cystine Content of Nails.....Edith M. Miller
58. The Composition of Mixed Human Salivas Secreted at Widely Different Rates.....N. J. Klotz and J. B. Brown
59. The Dual Function of the Venous Musculature of the Lung of the Frog, H. E. Hamlin, F. A. Waterman and H. G. Knierim
60. Polarized Light—A New Neurological Technique.....H. E. Setterfield
61. The Influence of the Female White Rat on Bodily Activity of the Male, E. P. Durrant
62. The Safety Factor in the Adrenal.....Frank A. Hartman
63. The Prognosis in Silicosis.....Emery R. Hayhurst
64. The Clinical Significance of Amyloidosis, Louis E. Barron, Wm. T. Haverfield and G. M. Curtis
65. Bodily Temperature as it Relates to Nervous and Mental Disorders, Carl W. Sawyer
66. Studies with Artificial Fever in Experimental Tuberculosis..Olga Bierbaum
67. The Hematologic Equilibria in Man as Influenced by Artificially Induced Fever, Malcolm M. Hargraves, with the assistance of Lucille Kester, R. N.
68. The Relation of the Non-Filament and Filament Polymorphonuclear Leucocytes, the Reticulocyte and Specific Gravity Changes in the Blood of Rabbits during Emotional Excitement, H. L. Katz and L. B. Nice
69. The Specific Gravity Changes in the Blood of Pigeons during Emotional Excitement.....David Frohman and L. B. Nice
70. A Comparative Study of Blood Groups of College Students and Insane Individuals.....C. A. Frey and Faye Campbell
71. The Medico-Legal Applications of the Agglutinogens M and N, Harriet S. Hyman
72. Possible Application of Chemical Reactions in the Determination of Pregnancy.....D. E. Bowman, J. P. Visscher and J. W. Mull
73. Importance of Pre-Experimental Attitude or Set in Distraction Experiments.....Kenneth H. Baker
74. Some Effects of Attitudes upon Personality Inventory Scores, Gordon Hendrickson
75. An Effort to Measure Fminine Sociality at the College Level...J. E. Janney
76. Differences between Children with Desirable and Undesirable Overt Behavior.....C. O. Mathews
77. The Switch-Board Learning Apparatus.....Winford L. Sharp
78. Rating of Non-Skilled Industrial Workers by a Form Board Test, Lorene Teegarden
79. A Prediction of Typewriting Success.....Katherine Simmons
80. Psychological Problems in Public Employment Offices and in the General Field of Public Personnel.....Lorin A. Thompson

81. Effect of Tobacco Smoke on the Growth and Learning Behavior of the Albino Rat and its Progeny.....Louis A. Pechstein
82. A Study of Attitudes of Beginning Students toward Psychology, H. J. Arnold
83. The Predictive Significance of Certain Items in the Application for Admission to Ohio State University.....Maurice E. Troyer
84. A Contribution to the Theory and Technique of Classification, Herbert A. Toops
85. The Spectrum of Nova Hercules.....N. T. Bobrovnikoff
86. Premedical Physics.....A. A. Bacon
87. The Energy Principle in Elementary Mechanics.....F. G. Tucker
88. Tuning an Organ to a Diatonic Scale.....L. W. Taylor
89. Numerical Methods in Quantum Theory.....L. H. Thomas
90. Intensity Relations by the Powder Method of Analysis as a Function of the X-Ray Wave-length.....F. C. Blake
91. Semi-portable X-Ray Outfit including Metal X-Ray Tube, Pumps, Electrical Equipment and Crystal Spectrograph.....C. E. Howe
92. The Million Volt Generator.....W. H. Bennett
93. Some Improvements in Heat Equipment for the General Laboratory, C. W. Jarvis
94. New Demonstrations of Alternating Current Phenomena. Leonard R. Crow
95. The Construction and Behavior of High Voltage Cylindrical Condensers, F. P. Bundy
96. The Infra-red Absorption Spectra of the X-Y_4 Type.....Alvin H. Nielsen
97. The Lake Port at Toledo.....Walter G. Lezius
98. Population Redistribution in Ohio.....Guy-Harold Smith
99. The Aerial Photographic Survey in the Muskingum Valley, Major Fred L. Smith
100. Announcement of the Field Excursion of the Section of Geology, Willard Berry
101. The Use of Air Photographs in Land Inventory Surveys....A. H. Paschall
102. Land Use Planning for Erosion Control.....J. S. Cutler
103. Notes on Ohio Town Patterns.....Alfred J. Wright
104. Geographic Regions of European Russia.....George D. Hubbard
105. Korea, the Land and the People.....Shannon McCune
106. Some Variations in Rainfall in the Salt Creek Watershed, Muskingum County.....Wm. D. Fentress
107. The Paint Creek Meteorite.....Karl Ver Steeg
108. Geographic Factors in the Treatment of Tuberculosis in Rutland, Mass.....Guilbert R. Graham
109. Stratigraphic Geography.....Eugene Van Cleef
110. The Preparation of Glucosidodihydroxyacetone Penta-acetate, L. C. Kreider and William Lloyd Evans
111. The Octenes of Type Three.....Sidney Kuykendall and Cecil E. Boord
112. The Teaching of Organic Chemistry.....J. R. Harrod
113. The Preparation of Some Tertiary Alcohols Containing the Nonane Chain.....W. R. Dial and G. R. Yohe
114. The Action of Molten Sodium Amide on some Simple Aliphatic Amines, G. E. Schmitkons, F. J. Robichaux and W. C. Fernelius
115. The Fractionation of Cracked Gasolene.....H. J. Hall and G. B. Bachman
116. The Chemical Nature of Tetany.....D. E. Babcock
117. The Preparation of Some Organic Salts and the Measurement of their Buffer Values.....W. J. Remington and H. V. Moger
118. The Separation of Chromium by Volatilization as Chromyl Chloride, M. H. Filson
119. Organic Flocculating Agents in the Quantitative Precipitation of Zinc Sulfide. A Proposed Separation of Zinc and Cobalt, J. R. Caldwell and H. V. Moyer
120. Demonstration of Surface Energy; Spontaneous Emulsification, John R. Caldwell
121. The Catalytic Oxidation of Carbon.....R. F. Robey and J. E. Day
122. Evaluation of Size Distribution from Sedimentation Data, C. G. Duncombe and James R. Withrow

SYMPOSIUM ON CHEMISTRY IN BIOLOGY

123. I. Methods of Studying the Hormones of the Adrenals, Dr. F. A. Hartman
124. II. The Chemical Basis of Nervous Activity...Dr. Albert P. Mathews
125. III. Chlorophyll and Photosynthesis.....Dr. Paul Rothemund
126. IV. The Vitamins, with moving pictures taken by Dr. T. S. Sutton, showing paralysis due to Vitamin A deficiency in rats, Dr. J. F. Lyman

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REPORTS

Report of the Secretary

Columbus, Ohio, April 19, 1935.

To the Ohio Academy of Science:

If "brevity is the soul of wit," this the twelfth annual report of your secretary will have at least one merit of interest. We desire once again to publicly acknowledge with high appreciation the fine spirit of co-operation on the part of all officers of the Academy and of forbearance on the part of the members during the year. As you know, of course, the secretary is by constitutional provision chairman of the program committee, made up of the several vice-presidents of the Academy, and he desires here and now to commend the present committee on the excellence of the sectional programs provided for this meeting. All honor and credit to the vice-presidents!

As you know, the work of the secretary does not end with the adjournment of the annual meeting. The proceedings must be prepared for publication and the printing carefully supervised. Fortunately the secretary is relieved of the work of mailing out the printed proceedings, this work being efficiently taken care of by the library staff at Ohio State University, the university even paying the postage. The duties of secretary are, to be sure, largely routine and when considered individually may seem insignificant and unimportant, but in the aggregate they represent a very considerable amount of time and effort. We have tried to take care of the many calls upon the office during the year as promptly and as efficiently as possible.

A very brief report of the forty-fourth annual meeting was prepared for and published in *Science* and the full proceedings appeared as the July, 1934, number of the Ohio Journal of Science.

According to the latest checking of the lists (the Treasurer's list, the Secretary's list and the mailing list of the Ohio Journal of Science) the membership of the Academy is about 472. The number varies of course, for several reasons, such as resignation, death, non-payment of dues, etc. These losses are, of course, regrettable, but there is compensation in the fact that new members come in to take the vacant places and great encouragement may be found in the possibility of greatly increasing our numbers if and when the present members are inspired to put forth even a little effort to secure new members. We suggest the following as our slogan for the coming year, viz.:

Every Member Get a New Member!

In a great state like Ohio, famous for its institutions of learning, we should easily stand first among the State Academies.

Your secretary attended the annual meeting of the American Association for the Advancement of Science in Pittsburgh last December and while there was present at one or two meetings of the Conference of State Academies and much to his surprise was elected Vice-President of the Conference for the ensuing year and according to custom will be the President the following year. For this reason, the secretary asks the honor of representing the Academy on the Council of the A. A. A. S. and at the Conference of State Academies at the next annual meeting to be held in St. Louis, Mo., in December of this year.

Respectfully submitted,

William H. Alexander,
Secretary.

Auditor's Report

Columbus, Ohio, March 29, 1935.

Professor A. E. Waller, Treasurer, The Ohio Academy of Science, Columbus, Ohio.

Dear Sir:—Complying with your instructions, I have completed my examination of the Cash Account and Statement of Receipts and Disbursements of The Ohio Academy of Science for the period from January 16, 1934, to December 31, 1934, and submit the following as my report of the Treasurer's Account:

Cash on hand, January 16, 1934		$ 376.52
Income and Receipts for period:		
Dues	$967.50	
A. A. A. S.	121.00	
Library	26.25	
Total Income and Receipts		1,114.75
Total		$1,491.27
Disbursements:		
Wm. H. Alexander, Secretary, Honorarium	$100.00	
Tax on Checks	.50	
Charges by Bank for Underbalances	.50	
Returned Check	2.50	
Postage, Telegrams, etc	55.50	
Ohio Journal of Science (300)	450.00	
Envelopes, Programs, Letterheads	123.21	
Safe Deposit Box	3.30	
Auditing	15.00	
Expenses;of Vice-Presidents for 44th Annual Meeting	71.97	
Speaker for Annual Meeting	25.00	
Court Stenographer	10.45	
W. H. Alexander, Secretarial Expenses	20.00	
Expenses to Executive Committee Meeting	18.70	
Total Disbursements		896.63
Cash Balance on hand, January 1, 1935		$ 594.64

The Cash Receipts have been traced to the depository and the Disbursements have been verified by cancelled checks and found to be correct.

On December 31, 1934, there were outstanding Accounts Payable to be met from the Academy funds as follows:

Rose McCabe, for Secretarial Services		$ 43.50
Spahr and Glenn, for Printing		5.50
Ohio Journal of Science (191 members)	$286.50	
Ohio Journal of Science (Proceedings)	199.96	
		486.46
Total Payable		$535.46

Should you have met these outstanding payables of $535.46 prior to December 31, 1934, your Cash Balance would have been reduced to $59.18. With membership dues not being paid until late in the year, this balance of $59.18 would not, in the interim, be sufficient to meet the current expenses. This then means that the Current Year expenses are paid from the Following Year receipts, a condition which should not exist. To correct this condition, one of two policies or a combination of both, should be enacted. Either the membership should be enlarged or the annual dues of $2.50 increased or the expenses reduced. I would not, however, consider it wise at this time to attempt much of an increase, if any, in the annual dues. There is, of course, always the possibility of increasing the membership, but until this can be accomplished the only possible procedure seems to be in the reduction of expenses. With this in mind, I have attempted to secure some comparative figures on the larger expense items and find the cost on the major item, "The Ohio Journal of Science," to be quite reasonable. This item does, however, offer a possibility for a considerable saving in the printing cost of this Journal—"The Proceedings." Only a small per cent of your members are interested in the Proceedings of a previous meeting and with the elimination of the Proceedings from your Journal a saving of approximately $200.00 would be reflected.

A considerable variation is noted in the expenses of the various Vice-Presidents. With the co-operation of these gentlemen, a further reduction of expenses could be made.

Other expense items might possibly be reduced as would the item of postage after the elimination of the fifty odd pages of proceedings from the Journal.

While there is a reserve fund in the custody of the Trustees of the Research Fund of the Ohio Academy of Science, an effort should be made to at least hold this fund intact rather than permit any condition whereby the same might be reduced or depleted.

While I have not had access to the records of the Trustees of the Research Fund of the Ohio Academy of Science, I am informed by the Ohio National Bank that on December 31, 1934, there was a cash balance on deposit in this Fund of $200.40. This balance January 16, 1934, was $237.14, reflecting some small disbursements during the period.

Respectfully submitted,

JAS. P. CORNETET,
Certified Public Accountant.

Report of the Executive Committee

COLUMBUS, OHIO, April 19, 1935.

To the Ohio Academy of Science:

The current Executive Committee has held three formal meetings during the year, one on November 3, 1934, one on January 26, 1935, and the third are last evening, April 18, 1935. All were held in Columbus and the first two well attended.

At the first meeting, after some discussion and a frank statement by the Editor-in-Chief of the Journal of Science, and in view of the Academy finances it was unanimously agreed that it would be unwise to grant the request of the Administrative Board for a special grant of $500.00.

The resolution introduced by Dr. F. C. Blake and passed by the Academy at the last annual meeting relative to an amendment to the Constitution and By-Laws regarding the disposition of funds received from the sale of publications was considered at this meeting and it was decided to prepare an amendment for subsequent approval of this and the Publications Committee's diverting said funds, together with the interest, from the invested research funds to aid in the publication of research. The following amendment to the By-Laws is suggested, viz.:

CHAPTER VII—*Research Fund.* Paragraph 1 amended to read:

The Research Fund shall consist of donations made in the aid of research and of sums paid in commutation of dues according to By-Laws, Chapter I, Paragraph 1. The interest received from invested research funds and all moneys received from the sale of Academy publications shall be used to aid in the publication of research.

The following applications for membership in the Academy were approved and are recommended for final election by the Academy, viz.: Richard P. Fowler, Guilford J. Ikenberry, J. F. Lyman, Victor A. Norling and R. K. Salisbury.

At the suggestion of the Treasurer, the Secretary was asked to prepare an amendment to the By-Laws authorizing the Vice-President of any Section so desiring to collect funds from the members of his Section to defray expenses of special meetings, field trips, etc.

At the second meeting of the committee the Secretary, as requested at the first meeting, submitted the following amendment to Chapter II:

PARAGRAPH 3. *Expenses of Special Section Meetings or Excursions.*—Any Section may by vote authorize its Vice-President to collect from its members funds necessary to defray the expenses of special meetings, field trips, or excursions, said section may wish to sponsor.

Paragraph 3 to be numbered 4.

The committee voted unanimously to recommend the passage of said amendment to the By-Laws.

At the second meeting, the following applications for membership in the Academy were approved and same are now recommended for final election by the Academy, viz.: William T. Bean, Leonard R. Crow, Mary Dora Rogick, and Charles A. Trimble.

At this meeting also the President of the Academy was made

a committee of one to make a thorough investigation of the printing costs of the Proceedings of the annual meeting and make report at the next meeting of the committee.

At the second meeting of the Committee the Secretary was asked to prepare and submit at next meeting a suitable amendment to the Constitution and By-Laws providing for a new class of members to be known as "Student Members" as suggested by Doctor Evans.

The third and last meeting of the committee was held at the Deshler-Wallick Hotel on the evening of April 18, 1935, with a rather small number present. In the absence of the secretary, Dr. Raymond C. Osburn acted as secretary.

Owing to the small attendance of the committee no action was taken on the suggested amendment to the Constitution and By-Laws providing for "Student Members." It was thought best to lay the matter before the Academy either for further consideration by the Executive Committee, or for action by the Academy at this meeting.

The same course was taken in the case of the proposed amendment concerning the Research Fund; that is, referred to the Academy without recommendation.

The applications for membership in the Academy of the following persons were received, favorably considered and are recommended for final election, viz.: Edith Marie Miller, Thomas T. Frost, and Edwin E. Jacobs.

Respectfully,

WILLIAM H. ALEXANDER,
Secretary.

Report of the Library Committee

COLUMBUS, OHIO, April 19, 1935.

To the Ohio Academy of Science:

The work of the chairman of this committee has been of the customary routine nature, such as correspondence, the care of the mailing list, claiming issues of periodicals that somehow failed to arrive, posting out issues of our publications, and the sales of publications.

Eleven new exchanges have been secured, four in this country, two in South America, three in Europe, one in Asia, and one in Africa. This makes a total of 382 exchanges on the mailing list.

It has been several years since a systematic check was made upon the exchanges to ascertain whether they are being received regularly at the Ohio State University Library. This project is now being carried on but not enough has been done for a report to be made at this time.

The report last year stated that the stock of the Ohio Naturalist and of the Ohio Journal of Science had been cleaned and wrapped and inventory taken but that the exact figures were not yet available at the time of the meeting. However, it was estimated that they would range from 300 sets of some of the volumes of the Ohio Naturalist down to 50 sets of a few of the volumes of the Ohio Journal of Science. The actual figures show that one volume of the Ohio Naturalist has one hundred sets, but that all the others have from 211 to 471 sets.

The stock of the Ohio Journal of Science varies greatly, from 27 sets each of volumes 24 and 25, to 370 sets of volume 18. Nine other volumes have 100 or more sets and eight volumes have fewer than 70 sets. There are no complete sets of volume 22, as the stock of number 6 of that volume was exhausted years ago. The scarce numbers of the stock of the Ohio Journal of Science at the present time are as follows: Vol. 23, No. 5, September, 1923; Vol. 24, No. 1, January, 1924; Vol. 25, Nos. 3 and 4, May and July, 1925; Vol. 26, No. 3, May, 1926; Vol. 27, Nos. 2 and 3, March and May, 1927; and Vol. 30, No. 5, September, 1930. If anyone who reads this report in the July issue of the Ohio Journal of Science has any of these scarce issues which he does not care to keep, they will gladly be taken back to be put into stock.

A corrected membership list of the Ohio Academy of Science was sent a week ago to "Scientia" in Milan, Italy. This is a new publication and the general secretary asked recently for a complete list of the names and addresses of the members in order that specimen copies could be posted to each one.

If one can judge from the sales of publications for the past year, the times are getting a little better. While the number of sales and the total amount did not approach those of a few years ago, yet a substantial increase was made over the preceding year. Exactly fifty items were sold in twenty-six sales. Eighteen sales were made to people in Ohio and eight to persons living in Utah, Oklahoma, Missouri, Tennessee, Indiana, Pennsylvania, and New York. The "Odonata of Ohio," by Dr. D. S. Kellicott, and the "Agaricaceae of Ohio," by Dr. W. G. Stover, headed the list, followed closely by Max Morse's "Batrachians and Reptiles of Ohio." Four copies of this last named paper were purchased by the Toledo Public Library and five copies of Dr. Stover's "Agaricaceae of Ohio" were bought by the library of the University of Cincinnati. The sales amounted to $32.30, of which $26.25 was given to the Treasurer before December 31st, leaving a balance on hands of $6.05. This sum has been given to him since the first of the year and will appear in his report for 1935.

For several years a formal financial statement of the sales account has been given in this report. This practice was discontinued last year as the account was too small to be considered apart from the account of the Treasurer. The statement for 1934 has been duly made and is on file for the purpose of record. There is in the bank at the present time the sum of $29.29. No money is yet being paid out on running stock certificates except dividends, but the building and loan company expects to be permitted to pay on such accounts before very long.

The stock of Special Paper No. 6, Dr. Lynds Jones' "Birds of Ohio," is now reduced to twenty salable copies. The members of the library committee recommend that no more copies be sold separately or sent in exchange but that all be kept for future use in complete sets of the Proceedings.

Respectfully submitted,

Ethel Melsheimer Miller,
Chairman.

Report of the Trustees of the Research Fund

COLUMBUS, OHIO, April 20, 1935.

To the Ohio Academy of Science:

The research funds of the Academy have not changed greatly during the past year. A grant of $100 was made to assist in the purchase of apparatus used in the Department of Chemistry at the Ohio State University, the total cost being $1,400 and the apparatus is now available to members of the Academy who may have occasion to use it.

The receipts January 1, 1934, to December 31, 1934, were $63.28 and the disbursements, as stated above, $100.

SUMMARY

Balance Checking Account January 1, 1934	$237.14
Receipts from Interest, etc.	63.28
Total	$300.42

DISBURSEMENTS

Grant for part cost of Chemical Apparatus	$100.00
Check Charge	.02
Balance in Checking Account	200.40
Total	$300.42

Receipts since January 1st bring our balance on checking account to $209.40 as shown by bank statement.

The securities held stand as in last year's report, listed at $1,737.50, which with the bank balance as of January 1, 1935, would give total assets of $1,937.90.

Respectfully submitted,

HERBERT OSBORN,
GEO. D. HUBBARD,
Trustees.

Report of the Publications Committee

COLUMBUS, OHIO, April 19, 1935.

To the Ohio Academy of Science:

In fulfilling its designated duties of attending to the publications of the Academy, the Committee made inquiries in various directions regarding manuscripts which might be suitable for publication by the Academy. The inquiries disclosed no manuscripts, and none came to the attention of the Committee through other channels.

A duty was laid upon the Committee by the following motion, offered by F. C. Blake, and approved by the Academy at the 1934 meeting:

"That the section of the constitution relative to money received from the sale of publications of the Academy being credited to the Research Fund be referred jointly to the Executive and the Publications Committee with instructions to prepare and present an amendment to the constitution of the Academy for action at the next annual meeting, if in the judgment of the joint committee it seems wise to do so, this motion to serve as notice of a proposed change."

Upon consideration the Committee sees no reason for amending the provision of the constitution referred to, and feels that hereafter the provision should be followed. A joint meeting of the Publications Committee and of the Executive Committee for Thursday evening, April 18, for consideration of Mr. Blake's motion was suggested by the Academy secretary, Mr. Alexander. At this meeting, which incidentally was poorly attended by both committees, an amendment suggested by the Executive Committee and approved by it at a previous meeting was presented for joint consideration. Since the Publications Committee had not learned of this suggested amendment earlier and since neither committee was sufficiently represented for an adequate discussion of the different viewpoints and for possible joint action, the Publications Committee feels that the matter should be deferred until the next meeting of the Academy to allow the two committees to give the matter their joint attention.

The Publications Committee wishes to suggest a change in the practice of the Academy with respect to that committee and the Academy representatives on the Administrative Board of the Ohio Academy of Science. Since the duties of the two groups are of much the same character and in neither case especially burdensome, we suggest that hereafter the Publications Committee serve also as the Academy representatives on the Ohio Journal of Science. As a matter of fact the by-laws say:

"The publications of the Academy are in charge of the Publications Committee."

Since the Ohio Journal of Science is the official publication of the Academy, the connection between the Administrative Board and the Publications Committee appear rather obvious.

The situation can be met by amending Article 4, Item 14. This now reads:

"**14.** *Duties of Publications Committee.*—The Publications Committee shall have charge of the preparation and publication of the Annual Report and of such other papers as may be considered by them desirable to have printed."

The Committee suggests the following change in this item, and offers it as an amendment to the constitution to be acted upon at the next meeting of the Academy.

"The Publications Committee shall serve as the Academy representatives on the Board of the Ohio Journal of Science, and shall have charge of the preparation and publication of the Annual Report and of such other papers as may be considered by them desirable to have printed."

Since the Administrative Board is composed of two members each from the Ohio State University and the Ohio Academy of Science, such a change would involve either (a) reducing the Publications Committee to two individuals, or (b) increasing the representation on the Administrative Board to three members from each group. Since the number of members on the Publications Committee is set at three by constitutional provision, the second alternative seems to be the simpler.

Until final action can be taken on the proposed amendment, the situation could be met and the arrangement given a trial by electing the present Academy representatives of the Administrative Board as members of the Publications Committee.

Respectfully submitted,

J. Ernest Carman,
Stephen R. Williams,
Frederick H. Krecker, *Chairman.*

Report of the Members of the Joint Administrative Board of the Ohio Journal of Science

Columbus, Ohio, April 20, 1935.

To the Ohio Academy of Science:

The only meeting of the Joint Administrative Board of the Ohio Journal of Science since the last report was held on the evening of April 18, 1935. Present were all members of the Board, Messrs. Rice, Shatzer, Transeau, and Blake, the Editor and Business Manager of the Journal.

Upon motion Dr. L. H. Snyder was re-elected Editor and Dr. B. S. Meyer, Business Manager of the Journal for the coming year.

Upon motion Dr. E. L. Rice was re-elected Chairman and Dr. B. S. Meyer, Secretary of the Board for the coming year.

The Business Manager presented a financial report for the year 1934, as follows:

THE OHIO JOURNAL OF SCIENCE, FISCAL YEAR 1934

Receipts

Balance from 1933	$ 278.42
University grant	650.00
Ohio Academy of Science	736.50
Ohio Academy of Science, Proceedings, 1934	199.96
Subscriptions	104.03
Sale of Back Numbers	27.80
Author's Payments for Plates and Publication of Papers Out of Order	214.18
	$2,210.89

Expenditures

Spahr & Glenn Co., Printing Volume 34	$1,421.79
Bucher Engraving Co	273.84
Postal Charges	148.74
Envelopes and Stationery	35.10
Clerical Assistance	5.00
Reprints	8.50
Federal Check Tax	.60
	$1,893.57
Balance on Hand, Feb. 25, 1935 (Huntington National Bank)	317.32
	$2,210.89

Upon motion the Business Manager's report was accepted and placed on file. This report was audited by a committee consisting of Profs. Rice and Shatzer and found to be correct.

Motion passed that beginning with the current year's report that the Business Manager submit his accounts to a professional audit before presenting them to the Board.

The Board then inspected an exhibit demonstrating the stages in the manufacture of the Journal, as prepared by the Editor for the present meeting of the Academy. A motion was passed expressing approval of the exhibit and commending the Editor for undertaking the labor of preparing it.

Respectfully submitted,

B. S. Meyer, *Secretary,*
Joint Administrative Board of
the Ohio Journal of Science.

Report of the Save Outdoor Ohio Council Committee

Columbus, Ohio, April 20, 1935.

To the Ohio Academy of Science:

Two years ago the Ohio Academy of Science did not maintain a membership in the Save Outdoor Ohio Council. It was understood that this membership was to be renewed following the organization of the Council. On January 2nd Mrs. McDonald called a meeting of the Save Outdoor Ohio Council for the purpose of reorganization. Because of its confidence in the work of the Council the Academy has taken out its membership immediately. The work of Mrs. McDonald is quite worthy of support but unfortunately she has been unable to continue as President due to poor health and absence from the State. The following officers of the Council were elected at the reorganization meeting:

BOARD OF DIRECTORS

Mrs. George McDonald, *Honorary President*.....Wyoming, Ohio
Mrs. Nora Halter, *President*.....1319 Birchard Ave., Fremont, Ohio
Mr. T. D. Peffley, *First Vice-President*.....P. O. Box 891, Dayton, Ohio
Mr. Harry N. Katz, *Second Vice-President*....2384 Indiana Ave., Columbus, Ohio
Mr. Roscoe W. Franks, *Executive Secretary*.....3040 Neil Ave., Columbus, Ohio
Mr. Joseph C. Goodman, *Treasurer*.....471 East Broad St., Columbus, Ohio

The purpose of the Council is to call together all of the agencies in the State interested in conservation. The plan is to co-operate both conservation education and conservation legislation. Various Chairmen of the Committee are as follows:

Chairman of Education Committee:
Dr. Raymond C. Osburn, Head, Dept. of Zoology, Ohio State University.

Chairman of Conservation Research Committee:
Mr. E. L. Wickliff, Chief, Bureau of Scientific Research, Ohio Division of Conservation, Columbus, Ohio.

Chairman of Forestry Committee:
Mr. Edmund Secrest, State Forester, Wooster, Ohio.

Chairman of Surface Water Utilization Committee:
Mr. T. H. Langlois, Chief, Bureau of Fish Propagation, Ohio Division of Conservation, Columbus, Ohio.

Chairman of Water Conservation Committee:
MR. DAVID C. WARNER, Executive Secretary, Ohio Water Conservation Board, Columbus, Ohio.

Chairman of Geology Committee:
DR. WILBER E. STOUT, State Geologist, Ohio State University.

Chairman of Game Management Committee:
DR. LAWRENCE E. HICKS, Chief, Division of Game Conservation, U. S. Erosion Service, Zanesville, Ohio.

Chairman of Archaeological and Historical Sites Committee:
MR. H. R. MCPHERSON, Curator of Parks, Ohio State Museum, Columbus, Ohio.

Chairman of Recreation Committee:
MR. OLIVER HARTLEY, Secretary, League of Ohio Sportsmen, Columbus, Ohio.

Chairman of Roadside Landscape Improvement Committee:
MR. DALLAS D. DUPRE, Landscape Architect, Ohio Dept. of Highways, Columbus, Ohio.

Chairman of Publications Committee:
MR. WALTER A. TUCKER, Editorial Staff, The Columbus Dispatch, Columbus, Ohio.

Chairman of Legislative Committee:
MR. J. F. ATWOOD, Attorney, 33 N. High St., Columbus, Ohio.

Office of the President:
1319 Birchard Ave., Fremont, Ohio.

It therefore seems that this Council is taking shape in a manner worthy of the enterprises for which it stands and I recommend your support of the organization.

Respectfully submitted,

A. E. WALLER.

Report of the Committee on the Election of Fellows

COLUMBUS, OHIO, April 20, 1935.

To the Ohio Academy of Science:

The Committee on the Election of Fellows met at the Deshler-Wallick Hotel on Thursday evening, April 18, 1935, for the purpose of considering nominations to fellowship in the Academy. The following persons whose nominations were found to be in proper form, satisfactorily supported by documentary evidence and countersigned by two fellows in good standing, each having received the required three-fourths vote of the Committee, were declared duly elected to Fellowship in the Academy, viz.:

DR. MARY AUTEN, Ashland College.
DR. EARL CLARK CASE, University of Cincinnati.
DR. FRED FOREMAN, Oberlin College.
DR. REUEL B. FROST, Oberlin College.
DR. AMOS HENRY HERSH, Western Reserve University.
DR. HERRICK LEE JOHNSTON, Ohio State University.
DR. SAMUEL CHARLES KENDEIGH, Baldwin Bird Research Laboratory.
DR. HARVEY V. MOYER, Ohio State University.
DR. IRA TEMPLIN WILSON, Heidelberg College.

Respectfully submitted,

WILLIAM H. ALEXANDER,
Secretary.

Report of the Committee on Necrology

Sketch of the Life and Work of Dr. Frank Carney

(Prepared by Prof. Geo. D. Hubbard, Oberlin College, at the request of the Committee.)

Frank Carney was born at Watkins, New York, March 15, 1868, son of an internationally minded farmer and student of current history. He studied and later taught in Starkey Seminary and in Cornell University. In 1895, after three years of regular work supplemented by work in the summer sessions, he was given Cornell's A.B. degree. He taught in Keuka Institute (1895–1909) and in the High School of Ithaca, New York. While vice-principal of the Ithaca High School, 1901–04, he served as assistant in Geology in the University one year and as instructor in the Cornell Summer School of Geography each summer.

In 1904 Mr. Carney was appointed Professor of Geology and Geography at Denison University, a position he held until 1917. Always studying and working in the field, he completed the requirements for the doctorate and was given that degree by Cornell University in 1909. During the Denison period Doctor Carney was called upon often for lectures and addresses; for three summers, 1909–11, he taught at the University of Virginia; in 1912 at Chicago; and for three summers, 1914–16, at Cornell University. During the year 1912–13 he was acting professor at Michigan and declined a permanent appointment there. While at Denison he was also an Assistant Geologist on the Ohio Geological Survey, 1907–17.

In 1917 Dr. Carney became Chief Geologist for the National Refining Company and soon moved to Texas. For eleven years he resisted the call to return to teaching, the work he loved most of all, but in 1928 he joined the faculty of Texas Christian University and the next year became Chairman of the Department of Geology and Geography of Baylor University at Waco, Texas, a place which he held until his death in December, 1934.

Doctor Carney was always a public-spirited man, interested in the progress of his profession, education, of his science, geography, and of his religion, his family and his community. He was always a forceful, clear, stimulating speaker and had many opportunities to speak, especially after his removal to Texas. He began writing for publication in 1901 and published forty-four scientific papers during the next seventeen years in the leading journals of his field. All these were the product of a lucid pen and scholarly mind. No papers appeared from 1917 to the end although his professional interests seem to have been as keen as ever. His executive work and restrictions growing out of that responsibility seem never to have dampened his ardor for research nor his scholarly thoughtful habits.

Professional recognition of his scientific work came in his election to Fellowship in the Geological Society of America, American Association for the Advancement of Science, and Ohio Academy of Science (president, 1909); to membership in the Association of American

Geographers (vice-president, 1915), American Association of Petroleum Geologists. American Institute of Mining and Metallurgical Engineers, Seismological Society of America, Michigan Academy of Science, Society of Economic Paleontologists and Mineralogists, Southwestern Social Science Association (chairman, Human Geography Section, 1934), Texas Academy of Science, Texas Geographic Society, C. L. Herrick Geological Society and the Sigma Xi.

But Professor Carney's most permanent work and finest products came out of his teaching. He loved it and brought everything to it necessary to make it successful. His students and colleagues, in speaking of his classroom and conference work, describe him as "personal, friendly, sympathetic, scholarly, inspiring, frank and honest, of sound judgment, a prodigious worker, able, lovable and worthy of every confidence and element of respect accorded him." Out of his thirteen years at Denison have come seventeen professional geologists and geographers. His personality has vividly impressed itself upon many more. In Carney's going we lose a friend, an inspiring teacher, a scholarly, exact writer, and a Christian gentleman.

Report of the Membership Committee

COLUMBUS, OHIO, April 20, 1935.

To the Ohio Academy of Science:

Your Committee on Membership has received and examined 22 applications for membership in the Academy, have found them in proper form, fees for one year paid and now recommend their election to full membership in the Academy, viz.:

BEAN, WILLIAM T., 733 Liberty St., Franklin, Penn.
BOBROVNIKOFF, N. T., Perkins Observatory, Delaware, Ohio.
CROW, LEONARD R., 1110 N. Eighth St., Terre Haute, Ind.
FOWLER, RICHARD P., 224 W. College St., Oberlin, Ohio.
FREEMAN, B. C., 225 E. Blake Ave., Columbus, Ohio.
FROST, THOMAS T., M. D., Ohio State University, Columbus, Ohio.
HAHNERT, WILLIAM F., Ohio Wesleyan University, Delaware, Ohio.
HARTMAN, FRANK A., Hamilton Hall, O. S. U., Columbus, Ohio.
HAMBLETON, J. C., 380 W. Eighth Ave., Columbus, Ohio.
HAMRE, HAROLD T., Wittenberg College, Springfield, Ohio.
IKENBERRY, GUILFORD J., 2221 Blake St., Berkeley, Calif.
JACOBS, EDWIN E., Ashland College, Ashland, Ohio.
KERSTEN, HAROLD JOHN, University of Cincinnati, Cincinnati, Ohio.
LYMAN, J. F., Townshend Hall, O. S. U., Columbus, Ohio.
MILLER, EDITH MARIE, 54 E. Longview Ave., Columbus, Ohio.
NORLING, VICTOR A., 612 Lawrence Ave., Girard, Ohio.
PASCHALL, ALFRED H., 139 Putnam St., Zanesville, Ohio.
ROGICK, MARY DORA, College of New Rochelle, New Rochelle, N. Y.
SALISBURY, R. K., Terrace Park, Ohio.
STURGEON, MYRON T., 259 W. Second St., Salem, Ohio.
TRIMBLE, CHARLES A., O. S. & S. O. Home, Xenia, Ohio.
WAREHAM, R. T., Department of Botany, O. S. U., Columbus, Ohio.

Respectfully submitted,

W. H. CAMP, Chairman,
CHARLES W. JARVIS,
WILBER E. STOUT,
Committee.

Report of the Nominating Committee

COLUMBUS, OHIO, April 20, 1935.

To the Ohio Academy of Science:

The Committee on Nominations begs to submit the following report, viz.:

President—WALTER H. BUCHER.

Vice-Presidents—

A. *Zoology*—DAVID F. MILLER.
B. *Botany*—GLENN W. BLAYDES.
C. *Geology*—MISS GRACE ANN STEWART.
D. *Medical Sciences*—CHARLES A. DOAN.
E. *Psychology*—JAMES R. PATRICK.
F. *Physics and Astronomy*—CHARLES W. JARVIS.
G. *Geography*—GUY-HAROLD SMITH.
H. *Chemistry*—K. G. BUSCH.
Secretary Chemistry Section—W. C. FERNELIUS.

Secretary—WILLIAM H. ALEXANDER.

Treasurer—A. E. WALLER.

Elective Members, Executive Committee—JAMES P. PORTER AND EUGENE VAN CLEEF.

Trustee, Research Fund—HERBERT OSBORN.

Publications Committee—E. L. RICE, C. G. SHATZER AND R. V. BANGHAM.

Library Committee—F. O. GROVER.

Committee on State Parks and Conservation—G. W. CONREY, E. L. WICKLIFF AND ARTHUR T. EVANS.

Joint Administrative Board, The Ohio Journal of Science—E. L. RICE.

Respectfully submitted,

NEAL F. HOWARD, Chairman,
ORVILLE T. WILSON (N. F. H.),
ROBERT A. KEHOE (N. F. H.),
EDMUND M. SPIEKER (N. F. H.),
RICHARD S. UHRBROCK,
R. L. EDWARDS,
RODERICK PEATTIE (N. F. H.),
WM. LLOYD EVANS.

PRESIDENTIAL ADDRESS

OUR SCIENCES WITH MAN LEFT IN

JAMES P. PORTER,

Ohio University

Mr. Chairman, Ladies and Gentlemen:

An International Congress was in session at one of our great eastern universities. The president of this university, Yale, was observed standing outside the entrance to the large dining hall carefully checking the speed and efficiency with which his guests were being served. To be sure the time was that of the late summer vacation. Could not some minor executive have followed up this attempt to serve the individual members of this great organization? Not to the full satisfaction of this great administrator who for many years earlier had been head of a department, the work of which emphasizes, if it does not require, attention to individuals by individuals. His democratic leadership is attested by the fact that in any significant proposed change those who are likely to be his severe critics and opponents are heard from early. The institution over which he presides has thus far been one of a very few to organize various related departments into an Institute of Human Relations. Here some of our sciences at least are determined to leave man in.

The primary concerns of The Ohio Academy of Science are to encourage and give due recognition to scientific research. Even if parts of our annual program are devoted to the aims and objectives of the particular sciences or all of them these considerations are gone about in ways which must stand the tests of rigorous scientific method. Indeed, this is now being done conspicuously by our youngest member, Chemistry. Our leaders in this section have carefully planned another feature of our program for tomorrow. This is nothing less than the Symposium on Chemistry in Biology. It is our hope that each of you will arrange to be present for at least a part of this well planned effort to give unity to the excellent investigations of some of our sciences. Some of our older sections may do well to see to it that this youngest does not leave us embarrassingly behind in the definition of aims, objectives, purposes and in unifying emphasis.

Some years ago the committee of the legislature of one of our western states was assembled to consider appropriation bills. One of these called for $25,000.00 for research by various departments of the state university. Following the reading of the bill one of the committee members asked, "What the hell is research?" No one knew. A motion to lay the bill on the table was immediately made. Is it merely wishful thinking if we assert that such a lack of understanding and what seems to us indefensible action would not so readily be found today in Ohio or elsewhere in the United States? If not, then is it not due to our having shown at least our political representatives that our sciences in content and method are worthy of careful consideration

and support because for one thing as we become more scientific we become more humane? In the world of machines, strange as it may appear, recent changes in their construction and use reveal that man is increasingly being left in.

Leaving more general consideration aside shall we then consider some of the definite steps to be taken by our sciences to develop in such a way that man himself, his welfare and happiness will not have been left out of what most of us fondly hope will prove to be one of the major achievements of modern civilization.

The successful selection of the young women and men, who by later labors prove that they have the scientific aptitude and other traits necessary for genuine achievement may well be one of our first tasks. Can't this be done, you ask, by the unaided judgment of the mature teachers, directors and investigators through their knowledge of the scholarship and physical and mental traits of their students and other available candidates? The answer we should like to make is "Yes." The real facts answer "No" with some emphasis.

We shall report briefly from a study made some years ago at Leland Stanford University. Zyve inspired and directed by Terman proceeded to construct a test for scientific aptitude. Many leading scientists of the past and present and also their achievements were studied in order to analyze the desirable if not essential elements. We quote: "1. *Clarity of definition*, the ability of the student to differentiate better definitions from poorer ones and appreciate their relative values. 2. *Experimental bent*, the tendency of the student toward experimentation. 3. *Suspended vs snap judgment*, the tendency of the student to draw final conclusions from insufficient data. 4. *Discrimination of values* in selecting and arranging experimental data. 5. *Detection of fallacies* and contradictions. 6. *Reasoning*, the ability to reason not only according to well-established rules such as may be found in certain typical mathematical problems but, also so far as possible, original reasoning. 7. *Accuracy of systematic observations*, the ability to observe, patiently and accurately by adopting some method of systematization. 8. The ability of the student to use given experimental data and form correct inductions, deductions and generalizations. 9. *Accuracy of understanding and of interpretation*, the ability to grasp the true meaning of a given body of information and to interpret it correctly. 10. *Caution*, the tendency of the student to investigate before adopting a method of behavior."

The one word expressing the most significant characteristic of these ten elements is—*Method*. Karl Pearson, certainly one of the leading English Scientists, has observed that those of his students who had achieved most in later life had been outstanding as students by their interest in, and mastery of, method.

Zyve's test built on the above outlined ten elements given to fifty research students in physics, chemistry and electrical engineering so agreed with the ratings by competent judges that the test enabled the author to predict success or failure in approximately three-fourths of the cases. This first attempt to construct such a test was more successful in selecting students with scientific aptitude than are the best intelligence tests in most cases, even after fifteen years of experimenta-

tion. Furthermore, if repeated, the reliability of this measure of scientific aptitude is fully equal to that of the best standardized tests and far higher than most examinations. It is not just another ability test and students of English, history and the languages obtain scores on it having little or no relationship to their college grades. The instances of its agreement and disagreement with judges reveal both its diagnostic and prognositic values. Careful comparison of its findings with graduate research students and faculty on the one hand and with unselected freshmen on the other strongly suggest that it measures aptitude and not training. It appears capable of finding real differences in aptitude for scientific work among highly selected and trained groups.

At Leland Stanford University which institution has for years evolved one of our most objective and thorough methods of admission of students the average score was well over 100. In a middle-western university which admits students who are graduates of accredited high schools the average score was well below 100.

From data secured from 140 men and 80 women, one of our own studies, carried out chiefly by Mrs. Virginia Hathaway, points to the following tentative conclusions as valid:

1. Scientific aptitude is positively but not highly related to so-called abstract intelligence, social intelligence and scholarship.
2. Abstract and social intelligence show evidence, both in their relation to each other and in their relation with scholarship, that they are measuring significantly similar traits.
3. There is no evidence that the testing program of colleges would be improved by adding examinations for scientific aptitude and social intelligence. There is ground for belief, however, that in carrying out problems of individual guidance and curriculum selection these tests may be used with value. Since the scientific aptitude is, as measured, evidently more remote from abstract intelligence than is social intelligence the use of this test promises to be the more significant for individual guidance.
4. Popular statements which suggest the complete dissociation of social intelligence from scholarship have some basis if abstract intelligence is ignored. Scientific aptitude is even more dissociated from academic standing.
5. A prediction of scholarship for women seems to be most successfully made by a knowledge of scientific aptitude, abstract intelligence and social intelligence ratings. For the men the abstract intelligence test results offer practically the same prediction. Predictions for scholarship are better for the women with every test but social intelligence.

Brief reference may be made at this point to the work of Dr. Moss and his associates on Aptitude Tests for Medical Students. The Journal of the Association of American Medical Colleges for January 1935 gives the following summary statements:

"The average grade in medical school in every case shows a gradual decline from the high tenth on test scores to the low tenth. In every instance, too, the percentage of failures increases markedly as test scores decrease."

The assistant to the president of Northwestern University has recently written as follows: "The Medical School tells me that some three or four years ago the applications ran as high as seventeen to eighteen hundred. Of this number one hundred twenty-five were accepted. Applications have dropped off to some extent until at present there are in the vicinity of thirteen hundred of whom we still select one hundred twenty-five. Of this one hundred and twenty-five approximately ninety per cent come to graduation; of the ten per cent who drop out from all causes one-third to one-half only are academic failures. So the academic failures for any one class during the four years would amount to somewhat less than five per cent."

This hearty response to our request furnishes us with first rate evidence of how one of our sciences leaves man and his welfare well within its attempt to train our future physicians. First, only the limited number which can be given individual training are admitted. Secondly, only those with high promise of success are given the opportunity. Thirdly, we can the more confidently look to the future success in actual practice of those so carefully chosen and trained. We can be certain that along the way in premedical and medical courses there has been careful scientific study of these ever-recurring problems of selection, training and certification.

Horace Mann, the great educational reformer, led the way in the introduction of written examinations which came near to the complete displacement of the oral. Within the past ten years we have had a most interesting modification of the written examination. The many forms of the so-called objective examinations are some of the results. Already the University of Chicago can report that the gains are significant and measurable. The wide differences appearing when two or more examiners graded the same old style examination paper have been known for a long time. This was a matter of deep concern particularly to the student. No wonder he so often believed that his attempts to get an education were extremely hazardous and unreliability and uncertain validity lay so largely outside his own interests and efforts. According to one of the University of Chicago authorities the objective examination has led to much greater uniformity and probably reliability of the customary essay-type examination.

The findings of the Minnesota Studies of Unemployment should be considered here chiefly for the reason that anything of significance and better promise for the future in employment is of such vital concern to us just now. Shall our sciences leave men in by working on the principle that the sole basis for placement on certain jobs shall be that the applicant wants that kind of work? Not if the Minnesota Employment Stabilization Institute data are typical of those for other parts of our country.

This Institute working in Minneapolis, St. Paul and Duluth and generously financed by one of our great foundations tried to proceed more scientifically. A number of examinations, tests and interviews were used followed by staff conference consideration of the individual applicant. One state official refused at first to join these staff conferences and since he held the power of assignment the employing was

done largely on the basis of the expressed wish of the applicant. There was a high percentage of failure. Later when he cooperated with the Institute staff the percentage of success was as high as failure had been before. In actual application our sciences will hardly leave man in without subjecting his ill-founded wishes even about the work by which he earns his living to most careful but considerate scrutiny.

An English investigator, Earle, not long ago wrote a book on "Choosing a Career." It is in the main an account of a carefully controlled study of what happens to boys and girls if they follow or do not follow the counsel given after thoro examinations of various abilities and traits have been made. Followed up after a few years those who acted on the counsel given are earning more money and what is more to the point perhaps, they are more permanently employed, more contented and happy. They and their employers agree on the advantage of acting upon counsel determined upon after tested methods have been applied.

Some four years ago our own President Bryan suggested that a major problem for study in at least one university might well be that of student dependability or reliability. For example, suppose a student on probation emphatically gave his word that he would meet the standards required if given another chance. What reliable and valid data could be obtained beforehand which would furnish those who have to decide in such difficult and, to the student at least, tragic cases? Well, we've made only a start. But from the very start we must look to the reliability of our mesaures. Merely physical instruments and materials must measure up to a high standard of reliability. A friend of mine in the engraving business invented an apparatus and method for testing the ink sold to him before he would undertake to use it in his finest engraving. Interestingly enough he did this at that time when we found that we could no longer depend on Germany for our chemicals.

It is clear that when we attempt to apply such tests as that of hearing loss, strength of grip, blood pressure, intelligence, mechanical ability, knowledge and mental power we are face to face with this problem of the reliability of our measures. Will the scientific material, apparatus or method used perform a second time and succeeding times as it did the first? Another requirement yet even more exacting is that our methods measure what they purport to measure. Let us illustrate both of these from some recent studies which we have reported as a part of the earlier programs of our own Academy. Some years ago our laboratory purchased at considerable cost an audiometer developed to test the hearing sensitivity of as many as forty children or adults at one time. Some four thousand children have been tested with this equipment; many of these in groups have been tested twice, a week or so apart; some have had even a third test. We can discover those with markedly defective hearing. Even if they are mentally bright and have progressed as far as high school they may not be aware of this defect. This hearing test equipment as a final test does serve us well to demonstrate to a devoted mother that her little daughter is very deaf indeed. It is therefore in this individual case a valid and

reliable test. But when we use it according to directions on groups of twenty to forty from ages seven to adult, make the statistical computations and make comparisons with statistically determined standards, apparently the set-up falls short of satisfying the reliability standards. It follows therefore that it would be wanting in validity as well. My present belief is that its failure to measure up to the rigorous scientific standards imposed is largely due to the variable factors introduced by changes in the subjects between the first and following tests as well as those variables brought in by testing many persons in the same room at the same time. Our sciences cannot worthily leave man in unless these variables are known and reckoned with or, remaining unknown, are recognized as further problems for research. Until we do have them reasonably well solved we stand to do man a disservice by making definite pronouncements by way of diagnosis and treatment.

The next and final main consideration of this discussion is: How shall we envisage the present and future labors of our sciences with man left in so as to get the largest and sanest social values? The members of each of our groups in the Academy, indeed of any science, believe profoundly in the social implications of their chosen fields of endeavor. As evidence of this there can be cited what many of you must have observed often during these five and more years of depression. Scientists have carried on as scarcely any other groups have done. In fact one might argue that in the face of reduced income and facilities many have found added satisfaction in increased labor and zeal. If they had to get along without able assistants they worked all the harder to train younger and less able workers. You will approve I feel if I report to you an observation from my experience as editor of the Journal of Applied Psychology. We have many contributors willing to pay an additional cost in order to have their articles published earlier than the one year approximately which the manuscript would have to be delayed if it took its regular turn.

All this and more signifies that there are manifold and richer meanings involved in sciences so conceived as to include man and his social gains or losses.

Dr. Brewer of Harvard University in 1928 published in the Personnel Journal a study of 4375 cases of discharges from industrial establishments. He classified the reasons for these separations under two main headings: Lack of skill or technical knowledge, and lack of social understanding. By skill the actual doing of the work was meant and by the technical knowledge the *science* back of the work—the *how*. "Social understanding" means human relationship-wisdom, those qualities of character which ordinarily go deeper than skill or technical knowledge.

While incompetence was the largest single cause all those causes which could be classified as skill constituted only a little more than one-third of the total—4375. In about five-eighths of the cases the social understanding causes were the determining factors. It should be kept in mind that no attempt was made to go back of the records kept by these companies the data from which was compiled by the Bureau of Vocational Guidance of Harvard University. Since 1929

another study has been made of a similarly large number of separations from employment in New England industries. Here too the combined effect of lack of skill or technical knowledge—incompetence, slow work, physical inadaptability and spoiling of work was only about one-half as often a determining factor in discharge as was lack of social understanding, that is, insubordination, unreliability, absenteeism, laziness, trouble making, drinking, violation of rules.

The relative influence of the technical versus the social organization of the workers in an industrial plant is brought out clearly in an investigation by Roesthlisberger and Dickson under the direction of the Graduate School of Business Administration and the George F. Baker Foundation of Harvard University.

Studies of small working groups were made at the Hawthorne plant of the Western Electric Company. Workers on the same level were found to exercise strong influence on each other. One may be the socially recognized leader of the group; another a social outcast because of lack of strict conformity with the group customs. It is shown that this social organization often defeats any wage incentive planned by the administration. Even in group piece work in which expert production by one individual would increase the pay envelopes of his co-workers the members of the group very often apply pressure to keep him from exceeding a limit arbitrarily set by themselves. Since the worker cannot himself initiate changes and finds it difficult to adapt to innovations, he blindly struggles to maintain the status quo. The success of management is found to be in its ability to introduce more efficient methods without disrupting the social foundations. This brief report has been taken quite literally from the Psychological Abstracts for April, 1935.

Almost instantly one asks himself if this finds its counterpart in our universities. Dr. Lehman of our Ohio University faculty has anticipated our question by his study of the motivating effect on grades of being pledged to a fraternity, the outstanding social group on the campus. Comparing grades for ten semesters, holding ability and other factors constant, he states that the chances are more than a 1,000,000 to 1 that the grades of the fraternity group *will go down* after the pledges have been initiated into the fraternity. The chances that a group of non-fraternity students' grades will *go higher* in succeeding and comparable semesters are 26 to 1. Motivation is of fundamental significance in all animal and human endeavor. It is being investigated today as never before. Dr. Lehman's study appeared in the February, 1935, issue of The Journal of Applied Psychology. A long list of comparable studies serves to throw into bold relief the unquestionable fact that our scientific achievements and their applications are conditioned and have their being in the social springs of action and behavior. Our sciences leave man and his social behavior out almost at their peril.

Closely related to the suggestive findings just mentioned are the conclusions of the studies of accidents by street railways, motor men, taxicab and truck drivers. We must give considerable weight to studies made by insurance companies in the effort to learn the causes of costly accidents. Their purpose is admittedly a money-saving one.

They employ scientists because they are convinced it pays them to do so. The leading cause of accidents in Cleveland was found to be that of mental attitude, so with a number of other companies employing scientists to make their investigations for them. One of the most significant outcomes of such studies is that with time, accurately gathered scientific knowledge and thorough planning a worker who is a liability can be changed into a valuable asset for the company and himself.

As an aid in understanding in part how our sciences are frustrated we feel constrained to cite Hoopingarner's statement: "Industry in general has been conducted on a conflict basis. Little or no mutuality of interest between capital and labor has been recognized." In each of our sciences and preeminently in those dealing directly with our bodies, our minds and human society we hear all too frequent criticisms racketeering in science. What is the preventive or cure? The rapid but sane development of the positive, constructive, cooperative social factors of each of our sciences. If ever we thought and worked in terms of the conflict basis as did industry and business then let us substitute for it the far more sensible mutual, integrative one.

Our sciences have more difficult tasks than have other disciplines and studies. The extent to which more hours have to be spent in the laboratory leaves less time and energy for the cultivation of the social graces, social judgments and decisions and the art of leadership. Common opinion and careful investigation both support the belief that students of the sciences face a more difficult task than do those majoring in other branches of knowledge.

Almost every member of our Ohio Academy of Science must have raised the question at least in his own mind as to the social and political implications of his teaching and original studies. Even if he has not, the new book called The Frustration of Science will be of keen interest. Concerning this treatise I quote the publisher's own words: "Departing from the academic seclusion which has hitherto restrained scientific men, particularly in America, from entering the field of political controversy, a group of British scientists hurl a bitter indictment at our present industrial and political leaders in a book called The Frustration of Science in which they charge that in every branch, the *destructive* powers of science are being fully exploited by those who now dominate the world, while the enormous constructive benefits which science has made available to society are neglected or deliberately suppressed." This is an overstatement, you say at once. It may well be. However, does not one of the reasons for such a protest by English Scientists rest in the unconcern for human social consequences shown by those who would apply the final fruition of scientific labor?

By no means would I have you understand that anything I have said or implied is to lead to a belittling of the relative worth of the individual person in our scheme of things. With Professor Carlton of the Case School of Applied Science there are many who are pointing out that modern industrial life is dominated by a machine technology; that each of us as consumer can hardly refuse to accept a standardized product at a standardized price; that even science reveals hard facts in nature (even human nature) in all their brutal realism; and that even the very increase in population tends to belittle the individual

person. Is there a way out of all this to be used by our sciences if they are to succeed in leaving man in? Is it too presumptuous to suggest that one way is to scientifically establish the facts of man's social life precisely as we establish the meaning of non-social facts? In each must we not resort to the same controlled and experimental methods? Each few days I pass by a room in one of our university buildings used by one of my colleagues in the Department of History. On the door of this room is a sign which reads "Laboratory Method in the Study of History." Our sciences can justly take much satisfaction in this gradual but certain influence in the adoption of their scientific method in the study of subject after subject earlier regarded as exclusively non-scientific.

"What prevents Social Progress?" by Professor Dwight Sanderson in the April Scientific Monthly gives us from one approach the answer to the question we have raised. Physical inventions have given us our radios, automobiles and aeroplanes. Social inventions which will insure a larger degree of social welfare and happiness depend just as fully on scientific research. The factors of that with which social inventions have to do are human beings and scientifically determined facts about them.

If time permitted citation after citation could be made to prove that our sciences are being called upon to assist business, industry, and government, to discover those who unquestionably possess the art of leadership. What specifically do such persons have to possess either by nature or by nurture? According to one of the best authorities, sense of purpose and direction, integrity, technical mastery, intelligence and faith. I challenge you to show me a group of individuals who exhibit in fact more of these traits than do individuals chosen from our sciences. You will have already observed that I have selected some of the qualities of Ordway Tead's classification of the necessary traits of successful leaders. It would be almost a miracle if our sciences called upon to select successful leaders for other disciplines should not ask themselves if their own leaders could not be selected and trained by the same scientifically controlled methods which they have been looked to for direction and inspiration from others.

As so-called scientists at least we can rather heartily subscribe to the spirit if not to the letter of the graduate of one of our Ohio institutions of higher learning as he writes, "I don't know what it is, nor how it's done, but in some mysterious fashion the students are given a human interest, a wide social outlook, and a growing philosophy of life. Most interesting of all they seem to have acquired an uncanny knowledge of the possibilities of this life." In substance, most members of our Academy would approve most heartily that if those whom we select and train are to finally find themselves as real men and women left really within the sane confines of our sciences we would do well to devote our best endeavors to their social training.

But have we positive, constructive evidence in real lessons from the sciences that we can use as proof that our sciences merit true confidence and faith, that they can produce leaders who are original, inspiring, sane and worthy? The free association method supplies

spontaneously so many examples. So quickly as to be really surprising, Agassiz, Shaler, James, Gordon, Millikan, Cattell, Thorndike, Angell, Miller, Morgan, Einstein, Fischer, Pupin, Haldane, Osborn, Langmuir, Richards, Bosch, Helmholtz, Darwin, Urey, Welch, DeVries, McDougall and numerous others. They and their achievements are the solid basis for the abiding faith to be found in the minds of scientists and science which compares so favorably with these same things in other groups. Having achieved so much without consciously leaving man in, we may within reason look forward to greater achievement when we with purposive intent go about our labors to leave him in.

Toward the close of a long and really successful life one of our scientists writes, "I am desirous of participating in the solution of one more problem in applied psychology. That is the problem of human happiness. Whether or not it fits in with one's philosophy of life, the fact is incontestable that happiness is an important if not the most important aim of human endeavor." These are the words of Dr. Raymond Dodge, the man who by his originality and mastery of scientific method gave to the United States Navy soon after we entered the World War such clever and ingenious inventions that highly skilled navy technicians were scarcely able to understand how such things were possible. Following Dr. Dodge's leadership we now have suggested at least that essentially human happiness for most persons is found in friends, work, nature, success in and enjoyment of work, good health in childhood, success in dealing with persons, and in love of nature. Are not these for the most part precisely those problems either directly or indirectly with which our sciences are preoccupied if they have been moved by impulses which left man and his real welfare in?

In closing then shall we resolve that the sciences in our own Academy shall do all they can to leave man in by—

1. The use of the best known methods to attract to, and select for, our groups those who have either by nature, by training, or both, the highly desirable if not necessary scientific aptitudes for carrying on successfully in their appointed fields of learning.

2. The devotion of our best and tireless energies to making our examinations reliable and valid so that they merit first our own respect, and following that, the respect of our students.

3. The development by scientifically recognized methods highly reliable apparatus and conditions of experiment free from exclusively commercial motives in order that our measurements, diagnoses and treatment may be freer from error and suspicion. Shall we place true values on reliability of performance, by persons, by apparatus, by methods, by well nigh everything?

4. Shall we recognize more fully and genuinely the many complex social problems involved in our sciences to the end that the nature and rights of the individual scientist, student of science and every citizen whose life is touched by science, are sensed, conserved and fostered?

A most fitting close to our discussion can well be in the words of one of my most respected and inspiring teachers, Dr. W. H. Burnham: "The highest form of the learning attitude is the scientific attitude and the scientific method is the great means of developing this attitude."

THE EFFECTS OF PROLONGED INCREASED IODINE FEEDING[1]

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The effects of adding supplemental iodine to the diet of man and of animals has long been a matter of controversy. As a result its advisability has been questioned. Consequently we welcomed a recent opportunity to investigate this problem.[2]

A valuable herd of high milk-producing Brown Swiss dairy cows in New York State had been fed a relatively high iodine supplement for a period of approximately three years. Extra iodine had been given as potassium iodide, in fish meal and in kelp, and as forage crops grown on soil fertilized by iodine-containing substances. Since in the past a number of studies on the effects of iodine feeding have been conducted upon an empirical basis, it seemed of importance to us actually to determine the amount of iodine consumed daily, also the daily excretion of iodine in the urine, feces and milk. In addition the blood iodine was determined.

One of us, (O. E.), has directed the feeding of several large herds of dairy cows in the states of Ohio, New York and Pennsylvania for the past twenty years. Following the work of von Fellenberg, iodine was added to the diets about 1915. These early iodine feeding experiments were of necessity carried on empirically. Adequate micromethods were not available. Since that time suitable methods for determining the iodine content of the blood, milk, ingesta and excreta have been developed (25). These are now being applied.

A preliminary report of the results of this investigation has already been made (28).

HISTORICAL

The basic facts concerning iodine in nutrition have recently been reviewed in a valuable monograph by Orr and Leitch (1).

Subsequent to the historic French experiment (1), Rilliet

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[2]This investigation was made possible by a grant from Mr. William Wallace Kincaid, Ellerslie-on-Niagara, Youngstown, New York.

described toxic symptoms which follow overdosage with iodine. He even denounced the procedure before the French Academy of Medicine. His arguments are still quoted by those hostile to supplementary iodine feeding. However, even before 1860 there were sporadic objectors. In this day of better scientific appreciation and understanding of the importance of minerals in the processes of life there are still those who censure adding iodine to the diet. The significance of minerals in nutrition has been effectively discussed recently by Sheldon (4).

As early as 1831 Boussingault collected data from the goitrous regions of the Andes which pointed to a close relationship between iodine and thyroid disease (1). Thirty-nine years after the discovery of elemental iodine by Courtois, Chatin began his extensive studies on the existence of iodine in nature (2). While his work was recognized, its importance was not fully appreciated at the time. In fact, contemporary chemists were unable to duplicate his findings. Modern advances in microchemistry have enabled scientists and clinicians, as well as chemists, to confirm the observations of these pioneers (3). The original deductions concerning the significance of iodine in biology and in pathology are now better understood, and more knowledge is being added (3, 4).

After preceding failures Baumann (5) succeeded in demonstrating the presence of a considerable quantity of iodine in the thyroid gland. This was in 1895. The thyroid hormone, *thyroxine*, was subsequently isolated, analyzed and synthesized (6, 7). Assay shows it to contain 65 per cent iodine. Recent investigations have further established the relation of iodine to goiter in man (8). The significance of adequate iodine in nutrition as a preventive to goiter is appreciated (4, 9). Adding iodine to the diet of pregnant women is recognized as a significant precaution (10, 11, 12). It would thus appear to be established that to function normally the thyroid gland should have an adequate supply of iodine.

Thus the ground that was lost from 1860 to 1895 has been rapidly regained. Progress in the understanding of iodine metabolism has greatly accelerated during the past decade. With further perfection of the microchemical methods now in use and with their application to determine the minute amounts of iodine occurring in nature, significant developments are certain to ensue.

LITERATURE

Lombroso (13) suggested that in districts where cretinism was common iodine should be added to the diets of animals as well as to those of goitrous individuals.

Several European workers have noted that increasing the iodine in the diet of dairy cows and of goats has increased the iodine content of the milk from these animals (14, 15, 16, 17, 18, 19). Karns in this country has made a similar observation (20). None of these investigators has mentioned any deleterious effects resulting from augmenting the iodine in the diet of their experimental animals. The quantitative studies reported have been done on laboratory animals or upon isolated animals. In no instance has a large number of animals been studied on the more scientific basis. Extensive work has been done on milking goats.

Scharrer found that larger quantities of iodine in the diet of goats increased the milk yield (17). Stiner reports specific instances of having increased the milk yield from 8 to 10 per cent by administering suitable amounts of iodine to cows in recognized iodine deficient areas (21). Hanzlik (22) observed that rats having a diet rich in iodine maintained a better general condition than those not having such a diet. In some of the animals there was an increase in weight and growth. This increase was variable. In his study he also used sulphocyanate, bromide, arsenic, thallium and manganese as controls. These salts brought deleterious results. Arsenic and thallium caused fatalities. Welch and others found that hairlessness in new-born pigs was preventable by giving the pregnant sow food to which appropriate quantities of iodine had been added (23, 24).

METHODS

The quantitative method which we have used for determining the iodine (25) is here summarized. It is the result of adapting modern technic, apparatus and procedures to the principles as developed by von Fellenberg (3). It is carried out in from five to six hours. In careful and experienced hands it is about as accurate and dependable as the micromethod for the determination of the non-protein nitrogen of the blood.

The material to be analyzed is measured or weighed into a nickel crucible and mixed with an adequate amount of potassium hydroxide. This base binds the iodine and facilitates

hydrolysis of the organic matter. After ashing completely the content of the crucible, at a carefully controlled optimum temperature, the water soluble salts are extracted. This extract is evaporated to dryness. The soluble salts are then extracted with 95% ethyl alcohol. The alcohol is evaporated. The remaining dry film containing the iodine salts is dissolved in water. The pH is adjusted to about 4. The iodides present are oxidized to iodates with chlorine water. The excess chlorine is boiled off. A crystal of potassium iodide is then added and the quantitatively liberated elemental iodine is titrated with one thousandth (0.001) normal sodium thiosulphate using starch as an indicator. An especially constructed microburet is recommended for this titration (26).

The food intake was measured by experienced attendants. Since the cows were allowed to drink water at will, from the regular stable fountains, it was impossible to make more than an estimate of the water intake.

Aliquot parts of representative food samples were analyzed. All analyses were made upon the wet basis. The milk, urine, and feces were collected over a period of 24 hours. Attendants were stationed with the cows for the entire 24-hour period. They collected and measured accurately the separate amounts from each cow. Blood was drawn in the usual manner at the end of the 24-hour period.

It is only in unusually efficient dairies that complete records of the milk and butter fat production are routinely kept over a long period of time. For this particular herd a nearly complete record for the years 1932 and 1933 was available.

The clinical condition of the herd was frequently inspected. Evaluation of the clinical results was based upon objective findings. The criteria considered in judging the effects of the prolonged increased iodine feeding were: (1) milk production; (2) general health of the herd; (3) fertility of the cows; and (4) the condition of the calves.

RESULTS

The results obtained are best presented in tabular form.

The iodine content of the foods ingested by the cows, over a continuous 24-hour period, is presented in Table 1. The "grain-mix," to which potassium iodide was added directly, obviously reveals the highest iodine content. The variation of intake, Table 5, is wide. This is due to the fact that the high

milk-producing cows were fed greater amounts of the more concentrated foods. The iodine ingested in the water and roughage is minimal in comparison. The iodine obtained from foraging, from salt, and from other uncontrollable sources is indeterminate. The actual iodine ingested when the cows were also foraging is doubtless in excess of that shown in the table.

TABLE I

IODINE INGESTED

Source	Iodine Mg. %	Kg. Fed Daily	Mg. Iodine Fed Daily
"Grain Mix"	2.006	2.721 to 9.071	54.59 to 181.98
Alfalfa Hay	0.0326	11.339	3.70
Carrots	0.0099	9.072	0.90
Steamed Feed	0.0508	9.072	4.91
Ensilage	0.0391	10.886	4.26
Water	0.00071	45.359	0.33

Total intake ranged from 68.7 to 196.1 mg. daily

Table II presents a summary of the iodine eliminated in the milk, urine and feces. These figures present the variation of the actual amount of iodine eliminated. The loss closely parallels the intake for each individual cow, Table V. Since the intake is variable a general average has no particular significance.

TABLE II

IODINE EXCRETED

Origin	Output	Iodine Mcgm. %	Mg. Iodine
Urine	10.1 to 18.6 L	269 to 1005	34.6 to 130.0
Feces	9.1 to 29.5 Kg.	140 to 468	15.2 to 71.5
Milk	7.7 to 27.5 L.	15.7 to 181.9	1.5 to 19.5

Total iodine output ranged from 51.7 to 163.4 Mg. daily.

Table III presents a summary of the daily milk production of these cows. Of the 17 cows on which data are available, 13 showed an increase in daily milk production for the year. The average increase was 9.1 pounds. Four of the cows showed a decrease during this period. One of these, No. 59, had been milked constantly over a period of one year and three months subsequent to calving. This cow had an average daily milk production for the month, eleven pounds lower than it was the year before. The other three showed a smaller decrease for the period. The average for the four cows is 7.3 pounds.

TABLE III

Comparative Daily Milk Production Record

Herd No.	November, 1932 Lbs. Milk	November, 1933 Lbs. Milk	Lbs. Gain	Lbs. Loss
32	43.6	53.7	10.1	.....
1	29.6	20.1	.....	9.5
8	19.7	29.9	10.2	.....
14	24.7	38.4	13.7	.....
13	20.5	48.2	27.7	.....
52	32.9	43.8	10.9	.....
59	40.8	29.8*	.....	11.0
24	20.2	20.7	0.5	.....
35	18.1	19.7	1.6	.....
19	17.6	28.1	10.5	.....
49	37.9	22.7	.....	4.3
54	40.2	35.9	.....	4.3
56	20.1	24.4	4.3	.....
2	22.3	23.0	0.3	.....
10	25.4	25.9	0.5	.....
50	24.9	29.5	4.6	.....

Average Increase in Production in 13 Cows, 9.1 lbs.
Average Decrease in Production in 4 Cows, 7.3 lbs.

*1 yr., 3 mo. after calving.

Cow 15 made the most outstanding improvement in milk production under this feeding regimen. Data are available on her as far back as 1929. In three years she increased both her milk and butter fat production approximately two and one-half times. Table IV presents this information in summary form from the official G. V. L. record.

Table V presents in summary form the relation between ingested and excreted iodine. The total iodine ingested and eliminated is given in milligrams.

The blood iodine of these animals on a high iodine diet is of particular interest. It is greatly increased. The first modern figure for the iodine content of bovine blood was obtained by Kendall and Richardson (27) as 13 micrograms per cent. In our own studies (25) made on blood from cattle killed at the abbatoir, the iodine content averaged 14 micrograms per cent. The normal human blood iodine is about 12 micrograms per cent (29). This figure has been obtained and confirmed by a large group of workers both in this country and abroad (29).

TABLE IV

Cow 15: 8 Years Old

1929

Average Daily Milk Production—25.0 lbs.
Total Milk Produced—9,139 lbs.
Average Percentage Butter Fat—4.9
Total Butter Fat Produced—447.7 lbs.

*1932**

Average Daily Milk Production—59.9 lbs.
Total Milk Produced—21,924.9 lbs.
Average Percentage Butter Fat—4.73
Total Butter Fat Produced—1,037.1 lbs.

*Official G. V. L. Record.

As shown in Table VI, the range in these twenty cows is from 35.9 to 78.1, averaging 54.9 micrograms per cent. The cows were thus living and reproducing with a blood iodine more than three times its normal level.

DISCUSSION

The value of adding iodine to the diet of dairy cows has been considered by many. Some have tested its effects. Unfortunately in most instances it has been necessary for those who favor the use of supplemental iodine in nutrition to make their experiments sporadically, and to base judgment of their results almost entirely upon objective clinical findings.

The native farmers of Normandy, two centuries ago, procured seaweed to feed their milking cows. They did this because they had discovered a more seemly appearance of the cows after having been fed seaweed. The existence of iodine in seaweed was then unknown. Hence their feeding seaweed was as empirical as the use of burnt sponge in the treatment of goiter. It was not until iodine had been used more or less

TABLE V

Herd No. of Cow	Iodine Ingested: Grain Mix	Alfalfa Hay	Carrots	Wet Steamed Feed	Ensilage	Water	Total Iodine Ingested	Iodine Excreted: Milk	Urine	Feces	Total Iodine Eliminated
							Mg.				Mg.
8	63.69	3.697	0.898	4.909	4.257	0.304	77.755	3.6	41.5	43.046	88.146
24	63.69	3.697	0.898	4.259	4.257	0.304	77.755	1.9	65.3	28.395	95.595
19	63.69	3.697	0.898	4.909	4.257	0.304	77.755	4.8	103.5	33.090	141.390
18	72.79	3.697	0.898	4.909	4.257	0.304	86.855	3.9	69.2	.....	.....
3	72.79	3.697	0.898	4.909	4.257	0.304	86.855	5.8	55.0	32.297	93.097
13	54.59	3.697	0.898	4.909	4.257	0.304	68.655	3.1	45.5	44.994	93.594
14	63.69	3.697	0.898	4.909	4.257	0.304	77.755	4.9	38.4	53.276	96.576
10	63.69	3.697	0.898	4.909	4.257	0.304	77.755	5.9	.....	23.496	.....
9	54.59	3.697	0.898	4.909	4.257	0.304	68.655	14.3	51.2	.....	.....
2	54.59	3.697	0.898	4.909	4.257	0.304	68.655	1.5	48.2	15.197	64.897
20	0.0	3.697	0.898	4.909	4.257	0.304	14.065	3.0	26.6	22.112	51.712
1	90.99	3.697	0.898	4.909	4.257	0.304	105.055	6.2	60.7	56.931	123.831
59	109.19	3.697	0.898	4.909	4.257	0.304	123.255	11.3	46.6	66.674	124.574
23	54.59	3.697	0.898	4.909	4.257	0.304	68.655	.....	34.6	54.539	.....
31	81.89	3.697	0.898	4.909	4.257	0.304	95.955	11.7	69.3	44.469	125.469
22	90.99	3.697	0.898	4.909	4.257	0.304	105.055	.....	77.2	35.844	.....
54	109.10	3.697	0.898	4.909	4.257	0.304	123.255	6.1	85.8	71.483	163.383
35	54.59	3.697	0.898	4.909	4.257	0.304	68.655	10.2	54.2	44.040	108.440
52	90.99	3.697	0.898	4.909	4.257	0.304	105.055	11.2	51.9	59.995	123.095
56	54.59	3.697	0.898	4.909	4.257	0.304	68.655	4.3	43.7	.....	.....
49	90.99	3.697	0.898	4.909	4.257	0.304	105.055	.....	130.0	34.638	.....
50	109.19	3.697	0.898	4.909	4.257	0.304	123.25	9.9	50.1	50.465	110.465
32	163.78	3.697	0.898	4.909	4.257	0.332	188.873	12.2	74.1	36.143	122.443
15	181.98	3.697	0.898	4.909	4.257	0.332	196.073	19.5	59.3	38.829	117.660

Average Iodine Ingested, 94.17 Mg.

TABLE VI

Blood Iodine in Micrograms Per Cent

Herd No. of Cow		Herd No. of Cow	
8	57.6	1	63.2
24	49.7	59	55.0
18	50.4	31	63.8
3	40.7	54	64.0
13	37.9	35	78.1
14	33.8	56	57.0
10	42.1	50	59.8
9	54.6	32	75.6
2	38.6	15	62.4
20	58.1	38	54.6

The range is from 33.8 to 78.1.
The average is 54.9 micrograms per cent.

extensively in the practice of medicine, and particularly in the treatment of goiter and of cretinism, that it was recommended for animals other than man. One of the earliest records of its use in the diet of animals is in 1859 (13).

Dairymen and veterinarians were slow to recognize the value of iodine as a dietary necessity. In fact many have been skeptical concerning its use, and have even suggested that iodine added to animal diets was likely to cause deleterious effects. The unfortunate experience of giving large amounts of iodine to French school children in 1860 is perhaps responsible for this attitude among those who have not studied the facts carefully.

Twenty years of experience in adding iodine to the food of dairy cows (O. E.) has yielded in no instance objective evidence of unfavorable effects directly or indirectly attributable to the extra iodine ingested. In fact, in those instances where an added iodine food regimen has been instituted, the milk production and the fertility of the cows have increased.

In this investigation, previous to the institution of the increased iodine regimen, still births, goitrous calves, and premature calves were noted. In one of the herds 75% of the cows were sterile or sporadically fertile. In 1933 85% of the cows of this herd were fertile. Some of them were descendants of the original sterile 75%.

Although in this particular study only 25 cows are included a similar increased iodine feeding regimen has been carried out over a period of from three to seventeen years on more than 500 dairy cows of various breeds throughout different localities in the Great Lakes region. In all instances the results have been

distinctly beneficial. In these herds the evaluation of the results has been based upon objective clinical findings.

The general mineral content of the diet of these cows was increased at the same time as that of the iodine content. It is therefore important to state that the subsequent improvement is not necessarily due to the iodine alone. The addition of calcium, phosphorus, iron and magnesium was undoubtedly beneficial to the general health of these animals. However, in other studies carried out by one of us (O. E.) the addition of elements other than iodine did not produce so marked an improvement in the physical condition and reproduction of the cows. It has been observed that the fertility of the cows improved after the addition of iodine to their food. The quality of the calves has improved over that before the institution of the iodine feeding regimen.

This investigation was carried out under definite technical difficulties. No claim is made that it represents a true balance experiment. The travail of making an accurate balance study on patients under strict modern hospital management is beset with difficulties. Hence even to attempt such an approximation upon a herd of dairy cows required courage. The information in Tables I, II, V and VI is as reliable as that given in the average laboratory experiment. The striking increase in the iodine content of the blood and of the milk is significant.

The data which are presented represent a fairly accurate estimate of the increased iodine transport. They show a great increase in the iodine intake. They reveal also a corresponding increase in the elimination of iodine in the urine, feces, and milk. They demonstrate the consequent elevation of the blood iodine. As a whole they reveal clearly increased iodine feeding. Since this had been maintained for a period of three years, and since the clinical condition of the herd was excellent, we were unable to demonstrate any deleterious effects of prolonged increased iodine feeding to these cows.

CONCLUSION

This investigation demonstrates that adding increased amounts of iodine to the diet of dairy cows does not ordinarily produce deleterious effects on the physical condition, general health, milk production and reproduction of these animals. Iodine is apparently beneficial when fed in optimal amounts or, in this instance, even in amounts in excess of the normal requirement.

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ADDITIONS TO THE REVISED CATALOG OF OHIO VASCULAR PLANTS. III[1]

JOHN H. SCHAFFNER

The Ohio State Herbarium, at present, contains over 40,000 sheets of vascular plants and in addition to these, collections of considerable size of bryophytes, algae and fungi. During the past year a large amount of material has been received, so large in fact that it has not yet been possible to study it all carefully.

Because of financial assistance furnished by the government through F.E.R.A., four students have been at work, for the allotted time, during three terms, cleaning and anchoring the old specimens and poisoning and mounting the new additions and one extra student has been at work during the spring quarter writing labels for the new specimens, which in itself requires a large amount of time. The herbarium will thus be in much better condition than it has been for a long time.

Complete lists of the species of plants of the Eastern United States, based on the Cambridge International Rules of Nomenclature, are still not available. It is thus considered advisable to continue to use mainly the American Rules until it is possible to make a complete revision, at least of the vascular plants.

Only the rarest and most important species are listed below. Among these are 22 species entirely new to the state catalog. There are also 12 additional Ohio records which have been taken from A. S. Hitchcock's new Manual of the Grasses of the United States and it is hoped that specimens of these will be found from time to time by our enthusiastic collectors. One species has been dropped from the list. The Catalog of Ohio Vascular Plants thus contains 33 more species than at the last report of additions.

During the past year the Department of Botany received a small bequest from Hannah J. Biddlecome, who died in 1934. Miss Biddlecome was one of the earliest amateur botanists of Ohio and in her later years took a special interest in the development of the State Herbarium, presenting her especially fine collections of mosses, liverworts, and ferns, which make a valuable addition to the representation of these groups.

[1]Papers from the Department of Botany, The Ohio State University, No. 363.

HYMENOPHYLLACEAE. Filmy-fern Family

10.2. *Trichomanes boschianum* Sturm. Filmy-fern. Lower end of Spruce Run, and also in Extein Hollow, Laurel Twp., Hocking Co. Chas. R. Goslin.

20. *Anchistea virginica* (L.) Presl. Virginia Chain-fern. Cranberry Island, Buckeye Lake, Licking Co. Clyde H. Jones.

35b. *Dryopteris cristata intermedia*. Edge of swamp. Braceville, Trumbull Co. Almon N. Rood.

53. *Equisetum laevigatum* A. Br. Smooth Scouring-rush. Oberlin, Lorain Co. A. A. Wright. Oberlin College Herb.

60. *Equisetum silvaticum* L. Wood Horsetail. Oberlin, Lorain Co. F. D. Kelsey. Oberlin College Herb.

67. *Lycopodium complanatum* L. Trailing Club-moss. Camp Wildwood, Big Walnut Creek, Franklin Co. L. E. Hicks and E. S. Thomas.

87.1. *Butomus umbellatus* L. Flowering-rush. According to a report by Mr. Louis W. Campbell, this species is spreading rapidly at Little Cedar Point, Lucas Co.

89. *Triglochin palustris* L. Marsh Arrow-grass. Kenard Bog, Salem Twp., Champaign Co. Lawrence E. Hicks.

101.1. *Potamogeton crispus* L. Curly Pondweed. Minerva Park Lake, Franklin Co. F. B. Chapman.

115. *Nelumbo lutea* (Willd.) Pers. American Water-lotus. Loramie Reservoir, McLean Twp., Shelby Co. John H. Schaffner.

150. *Scirpus planifolius* Muhl. Flat-leaf Clubrush. Colerain Twp., Ross Co. Floyd Bartley and Leslie L. Pontius.

160.1. *Eleocharis rostellata* Torr. Beaked Spike-rush. County Line Bog, west of West Liberty, Champaign Co. L. E. Hicks. Silver Lake, Bethel Twp., Miami Co. E. S. Thomas.

178. *Cyperus flavescens* L. Yellow Cyperus. Seaman Station, Adams Co.; Henley, Scioto Co.; Kincaid Springs, Pike Co. Katie M. Roads. Friendship, Scioto Co. Delzie Demaree.

180. *Cyperus diandrus* Torr. Low Cyperus. Marl Bog on Mrs. Hugh McCoy Farm, Wayne Twp., Fayette Co. Edward S. Thomas and John H. Schaffner.

181. *Kyllinga pumila* Mx. Low Kyllinga. Brush Creek Twp., Highland Co. Katie M. Roads. Cincinnati, Hamilton Co. J. F. James. Columbus, Franklin Co. Wm. C. Werner.

188. *Scleria verticillata* Muhl. Low Nut-rush. Marl bog on Mrs. Hugh McCoy Farm, Wayne Twp., Fayette Co. Edward S. Thomas and John H. Schaffner.

189. *Scleria triglomerata* Mx. Tall Nut-rush. Liberty Twp., Jackson Co. Floyd Bartley and Leslie L. Pontius.

191. *Carex sartwellii* Dew. Sartwell's Sedge. Colerain Twp., Ross Co. Floyd Bartley and Leslie L. Pontius.

220. *Carex deweyana* Schw. Dewey's Sedge. "Dry soil, top of rocks." Nelson Ledge, Nelson Twp., Portage Co. Roscoe J. Webb. Received from Almon N. Rood.

265. *Carex plantaginea* Lam. Plantain-leaf Sedge. Liberty Twp., Jackson Co. W. H. Camp. The same Twp., Floyd Bartley and Leslie L. Pontius.

287. *Carex flexuosa* Muhl. Slender-stalked Sedge. Liberty Twp., Jackson Co. Floyd Bartley and Leslie L. Pontius.

288.1. *Carex sprengelii* Dew. (*C. longirostris* Torr.). Long-beaked Sedge. "Dry soil, top of rocks." Nelson Ledge, Nelson Twp., Portage Co. Roscoe J. Webb. Received from Almon N. Rood.

298. *Carex lacustris* Willd. Lake-bank Sedge. Beach City, Sugar Creek Twp., Stark Co. W. H. Camp.

308. *Carex vesicaria* L. Inflated Sedge. Liberty Twp., Jackson Co. Leslie L. Pontius and Floyd Bartley.

325. *Arundinaria tecta* (Walt.) Muhl. Cane. A very large patch in a swamp in southern part of Concord Twp., Highland Co. Katie M. Roads. Near Latham, Mifflin Twp., Pike Co. On moist slope; patch about 10 ft. sq. A. E. Waller.

332. *Bromus inermis* Leyss. Hungarian Brome-grass. Accidental on Ohio State University Campus. Columbus, Franklin Co. Specimen with the upper spikelets proliferated. Clara G. Weishaupt.
352. *Panicularia pallida* (Torr.) Ktz. Pale Manna-grass. West Swamp, Oberlin, Lorain Co. E. S. Steele (Contributed by F. O. Grover). Liberty Twp., Jackson Co. Floyd Bartley and Leslie L. Pontius.
355. *Poa autumnalis* Muhl. Flexuous Spear-grass. Berne Twp., Fairfield Co. Wm. Goslin.
379.1. *Leptochloa fascicularis* (Lam.) Gr. Salt-meadow-grass (*Diplachne fascicularis* (Lam.) Beauv.). Buckeye Creek, Liberty Twp., Jackson Co. Floyd Bartley and Leslie L. Pontius.
382. *Phragmites phragmites* (L.) Karst. Common Reed-grass. Cedar Swamp, Champaign Co. Glenn W. Blaydes.
384. *Danthonia compressa* Aust. Flattened Wild-oat-grass. Braceville Twp., Trumbull Co. Almon N. Rood.
385. *Arrhenatherum elatius* (L.) Beauv. Oat-grass. Pickaway Twp., Pickaway Co. Floyd Bartley and Leslie L. Pontius.
390. *Deschampsia caespitosa* (L.) Beauv. Tufted Hair-grass. Kenard Bog, Salem Twp., Champaign Co. L. E. Hicks.
402. *Agrostis elliottiana* Schultes. Elliott's Bent-grass. Rock Run, Liberty Twp., Jackson Co. Leslie L. Pontius and Floyd Bartley.
416. *Muhlenbergia sobolifera* (Muhl.) Trin. Rock Muhlenbergia. Liberty Twp., Jackson Co. Leslie L. Pontius and Floyd Bartley.
432. *Torresia odorata* (L.) Hitchc. Vanilla-grass. Pleasant Valley, Muskingum Co. Edward S. Thomas.
438. *Lolium multiflorum* Lam. Awned Darnel. Waste ground, Columbus, Franklin Co. John H. Schaffner.
464.1. *Panicum anceps* Mx. Beaked Panic-grass. Liberty Twp., Jackson Co. Floyd Bartley and Leslie L. Pontius.
472.1. *Panicum tuckermani* Fern. Tuckerman's Panic-grass. Liberty Twp., Jackson Co. Leslie L. Pontius and Floyd Bartley.
474. *Panicum depauperatum* Muhl. Starved Panic-grass. Liberty Twp., Jackson Co. Floyd Bartley and Leslie L. Pontius.
481. *Panicum bicknellii* Nash. Bicknell's Panic-grass. Liberty Twp., Jackson Co. Leslie L. Pontius and Floyd Bartley.
483.1. *Panicum yadkinense* Ashe. Spotted-sheath Panic-grass. Liberty Twp., Jackson Co. Floyd Bartley and Leslie L. Pontius.
488. *Panicum lindheimeri* Nash. Lindheimer's Panic-grass. Liberty Twp., Jackson Co. Leslie L. Pontius and Floyd Bartley.
490. *Panicum tsugetorum* Nash. Hemlock Panic-grass. Sandstone cliff, Toboso, Licking Co. R. B. Gordon.
491. *Panicum villosissimum* Nash. Villous Panic-grass. Liberty Twp., Jackson Co. Leslie L. Pontius and Floyd Bartley.
492a. *Panicum huachucae fasciculatum* (Torr.) Hubb. Liberty Twp., Jackson Co. Floyd Bartley and Leslie L. Pontius.
493. *Panicum meridionale* Ashe. Matting Panic-grass. Liberty Twp., Jackson Co. Floyd Bartley and Leslie L. Pontius.
500. *Syntherisma filiforme* (L.) Nash. Slender Crab-grass. Adamsville, Muskingum Co. L. E. Hicks and C. A. Dambach.
504. *Echinochloa frumentacea* (Roxb.) Link. Billion-dollar-grass. Glenford, Perry Co. L. E. Hicks and C. A. Dambach. Along R. R. track. New Vienna, Clinton Co. Katie M. Roads.
534. *Allium tricoccum* Ait. Wild Leek. Buchtel, Athens Co. Len. Stephenson.
568. *Disporum maculatum* (Gr.) Britt. Spotted Disporum. Wooded North hillsides, Camp Gordon, C. C. C. Friendship, Scioto Co. Delzie Demaree.
574. *Unifolium canadense* (Desf.) Greene. False Lily-of-the-Valley. Rock Run, Liberty Twp., Jackson Co.; Sugar Creek Twp., Stark Co. W. H. Camp.
579. *Smilax ecirrhata* (Engelm.) Wats. Upright Smilax. Laurelville, Hocking Co. Muriel Sayre.
589. *Tradescantia pilosa* Lehm. Zigzag Spiderwort. Brown County. Clara G. Weishaupt.

594. *Juncus balticus* Willd. Baltic Rush. Mantua Twp., Portage Co. R. J. Webb and Almon N. Rood.

599.1. *Juncus greenei* Oakes & Tuckerm. from Trumbull Co. Remove from list. According to S. C. Wadmond, of Wisconsin, who is making a special study of Juncus, this is *Juncus gerardi* Lois. (No. 595), a common coastal plain species occurring rarely in the Great Lakes region.

603. *Juncus articulatus* L. Jointed Rush. Marl bog on Mrs. Hugh McCoy Farm, Wayne Twp., Fayette Co. Edward S. Thomas and John H. Schaffner.

611. *Juncoides carolinae* (Walt.) Ktz. Hairy Wood-rush. Berne Twp., Fairfield Co. Wm. Goslin.

613. *Juncoides bulbosum* (Wood) Small. Bulb-bearing Wood-rush. Near Fort Ancient, Warren Co. Katie M. Roads.

617.1. *Narcissus jonquilla* L. Jonquil. Escaped in a thicket, Buchtel, Athens Co. From Europe. Len. Stephenson.

622. *Gemmingia chinensis* (L.) Ktz. Blackberry-lily. Growing wild in Morgan Co. R. D. Book.

632.1. *Iris verna* L. Spring Dwarf Iris. Jefferson Twp., and Union Twp., Scioto Co. A. E. Waller.

659. *Ibidium beckii* (Lindl.) MacM. Little Lady's-tresses. Harrison Twp., Vinton Co. Edward S. Thomas.

682. *Ranunculus micranthus* Nutt. Rock Crowfoot. Sycamore Twp., Hamilton Co. Anna Roberts. Westerville, Franklin Co. W. H. Camp.

745. *Papaver rhoeas* L. Field Poppy. Liberty Twp., Jackson Co. Leslie L. Pontius and Floyd Bartley.

746. *Papaver dubium* L. Corn Poppy. Liberty Twp., Jackson Co. Floyd Bartley and Leslie L. Pontius.

765. *Draba verna* L. Vernal Whitlow-grass. Red Hills, Delaware Co. W. H. Camp.

770. *Camelina microcarpa* Andrz. Small-fruited False-flax. Near Cedar Swamp, Champaign Co. John H. Schaffner.

788. *Myagrum perfoliatum* L. Myagrum. Columbus, Franklin Co. Juliet Coles.

812. *Arabis virginica* (L.) Trel. Red Hills, Delaware Co. W. H. Camp. Conkles' Hollow, Hocking Co. John H. Schaffner.

825. *Dentaria maxima* Nutt. Large Toothwort. Wellsville, Columbiana Co. Donald F. Wiegel.

853. *Geranium pusillum* L. Small-flowered Crane's-bill. Wayne Twp., Fayette Co. Edward S. Thomas and John H. Schaffner.

885. *Polygala ambigua* Nutt. Loose-spiked Milkwort. Salem Twp., Meigs Co. Clyde H. Jones.

916. *Malva sylvestris* L. High Mallow. Liberty Twp., Jackson Co. W. H. Camp.

920. *Callirhoe involucrata* (T. & G.) Gr. Poppy-Mallow. Along the railway tracks. Frazeysburg, Muskingum Co. Coll. Inez Baker. From E. S. Thomas.

976.1. *Viola primulifolia* L. Primrose-leaf Violet. In swamp, Buckeye Creek, Liberty Twp., Jackson Co. Floyd Bartley and Leslie L. Pontius.

979. *Viola affinis* Le C. Thinleaf Blue Violet. Rich open woods. Otway, Scioto Co. Delzie Demaree.

982. *Viola hirsutula* Brain. Southern Wood Violet. Burton, Geauga Co. Chas. A. Dambach.

1006. *Cerastium viscosum* L. Mouse-ear Chickweed. Liberty Twp., Jackson Co. Floyd Bartley and Leslie L. Pontius.

1035. *Dianthus armeria* L. Deptford Pink. Turkey Creek bottoms, Friendship, Scioto Co. Delzie Demaree.

1060.1. *Chenopodium incanum* (Wats.) Heller. Mealy Goosefoot. From the west. In a vacant lot along the railway. Hillsboro, Highland Co. Katie M. Roads.

1084.1. *Lysimachia producta* (Gr.) Fern. Leafy-bracted Loosestrife. Liberty Twp., Jackson Co. Leslie L. Pontius and Floyd Bartley.

1103. *Pleuropterus zuccarinii* Small. Japanese Knotweed. Liberty Twp., Jackson Co. Floyd Bartley and Leslie L. Pontius.

1125. *Polygonum tenue* Mx. Slender Knotweed. Old Washington, Guernsey Co. Emma E. Laughlin.
1139. *Potentilla pumila* Poir. Dwarf Fivefinger. Rock Run, Liberty Twp., Jackson Co. W. H. Camp.
1162. *Filipendula rubra* (Hill.) Rob. Queen-of-the-prairie. Cantwell Cliff, Hocking Co. Glenn W. Blaydes. Kenard Bog, Champaign Co. L. E. Hicks.
1170.1. *Rosa wichuraiana* Crep. Dorothy Perkins Rose. A hybrid var. of the species. "Long persistent and spreading from discarded cuttings thrown in a gully." Washington Twp., Highland Co. Katie M. Roads.
1178.1. *Rosa lyoni* Pursh. Lyon's Rose. Wilson's Fork, Camp Gordon, C. C. C., Friendship, Scioto Co. Delzie Demaree.
1204. *Aronia atropurpurea* Britt. Purple Chokeberry. Brewster Bog, Sugar Creek Twp., Stark Co. W. H. Camp.
1206.1. *Amelanchier intermedia* Spach. Woolly Juneberry. Cedar Point, Erie Co. Edward S. Thomas. Apparently this species as treated in Britton and Brown.

CALYCANTHACEAE. Strawberry-shrub Family

1229.1. *Calycanthus nanus* (Loisel.) Small. Smooth Strawberry-shrub. Native in Salem Twp., Meigs Co. Three miles southwest of village of Salem Center. Clyde H. Jones.
1230. *Acuan illinoensis* (Mx.) Ktz. Illinois Acuan. Two places along a small stream, Washington Twp., Highland Co. Katie M. Roads.
1258. *Lotus corniculatus* L. Bird's-foot Trefoil. Adams Co. D. R. Dodd.
1266. *Phaca neglecta* T. & G. Cooper's Milk-vetch. Bank of Grand R., Perry, Lake Co. H. C. Beardslee and F. J. Tyler.
1267. *Amorpha fruticosa* L. False Indigo. Escaped from cultivation in Cincinnati, Hamilton Co. Robert B. Gordon.
1278.1. *Meibomia laevigata* (Nutt) Ktz. Smooth Tick-trefoil. Barlow, Washington Co. D. R. Dodd.
1313. *Lathyrus tuberosus* L. Tuber-bearing Pea. "Growing on right of way, New York Central R. R." Madison, Lake Co. Harry Crofoot. From F. J. Tyler.
1330.1. *Sedum album* L. White Stonecrop. On ledges of Rocky Fork Creek, Paint Twp., Highland Co. From Europe. Commonly cultivated. Katie M. Roads.
1341. *Chrysosplenium americanum* Schwein. "Neotoma," Goodhope Twp., Hocking Co. Edward S. Thomas.
1350.1. *Daphne mezereum* L. Mezereum. Escaped from cultivation. From Europe. In a swamp. N. E. of Austinburg, Ashtabula Co. Lawrence E. Hicks.
1417a. *Fagus grandifolia caroliniana* (Loud.) Fern. & Redh. Camp Gordon, Friendship, Scioto Co. Delzie Demaree.
1429. *Quercus triloba* Mx. Spanish Oak. Vernon Twp., Scioto Co. Conrad Roth.
1438. *Betula lutea* Mx. f. Yellow Birch. In a narrow bog, Swanton Twp., Lucas Co. Louis W. Campbell.
1439.1. *Betula papyrifera* Marsh. Paper Brich. A single tree, evidently native, in a narrow bog in Swanton Twp., Lucas Co. Several trees of *B. lutea* were growing near it. Louis W. Campbell.
1536.1. *Comandra livida* Rich. Northern Bartard Toad-flax. Brewster Bog, Sugar Creek Twp., Stark Co. W. H. Camp.
1565. *Oxycoccus macrocarpus* (Ait.) Pursh. Large Cranberry. Kenard Bog, Salem Twp., Champaign Co. L. E. Hicks.
1592. *Convolvulus fraterniflorus* Mack. & Bush. Short-stalked Bindweed. "In many localities," Highland Co. Katie M. Roads.
1587. *Quamoclit coccinea* (L.) Moench. Small Red Morning-glory. Along the banks of the Ohio River, Scioto Co. Conrad Roth.
1614. *Chionanthus virginica* L. Fringe-tree. Banks of Rocky Fork, Otway, Scioto Co. Delzie Demaree.
1624. *Gentiana crinita* Froel. Fringed Gentian. Marl bog on Mrs. Hugh McCoy Farm, Wayne Twp., Fayette Co. Edward S. Thomas and John H. Schaffner.

1672. *Physalis pubescens* L. Low Hairy Ground-cherry. Cuba, Clinton Co. Katie M. Roads.
1750. *Martynia louisiana* Mill. Unicorn-plant. A weed in a garden. Kenton, Hardin Co. Harry Grigsby.
1759. *Stomoisia cornuta* (Mx.) Raf. Horned Bladderwort. Kenard Bog, Salem Twp., Champaign Co. L. E. Hicks.
1796.1. *Ajuga reptans* L. Creeping Bugleweed. Along the roadside near Hillsboro, Highland Co. Katie M. Roads.
1816. *Mentha rotundifolia* (L.) Huds. Roundleaf Mint. Along the road near Prospect, Washington Twp., Highland Co. Katie M. Roads.
1829.1. *Koellia verticillata* (Mx.) Ktz. Torrey's Mountain-mint. Kent Run, Muskingum Co. L. E. Hicks and C. A. Dambach. Swampy open bottoms, Blue Creek, Adams Co. Delzie Demaree.
1831. *Koellia pycnanthemoides* (Leav.) Ktz. Southern Mountain-mint. Turkey Creek bottoms, Friendship, Scioto Co. Delzie Demaree.
1875.1. *Salvia coccinea* L. Hairy Scarlet Sage. "A very common escape and very persistent." Liberty Twp., Highland Co. Cultivated from the south. Katie M. Roads.
1910. *Aethusa cynapium* L. Fool's-parsley. Near Beach City, Sugar Creek Twp., Stark Co. W. H. Camp.
1947. *Houstonia lanceolata* (Poir.) Britt. Calycose Houstonia. In a wood near Cuba, Clinton Co. Katie M. Roads.
1973. *Viburnum alnifolium* Marsh. Hobblebush. Windham Twp., Portage Co. R. J. Webb, L. S. Hopkins and Almon N. Rood.
2001.1. *Diervilla hybrida* Dipp. Cultivated Bush-honeysuckle. "Common escape along road." Hillsboro, Highland Co. Katie M. Roads.
2031.1. *Zinnia elegans* Jacq. Zinnia. "Thousands in the edge of a pasture" near Buchanan, Pike Co. Katie M. Roads.
2039a. *Rudbeckia laciniata hortensia* Bail. Golden-glow. In a field in N. E. part of Brown Co., edge of pasture lot, N. W. part of Ross Co.; along roadside, S. E. part of Pike Co.; edge of pasture lot, Seaman Station, Adams Co. Katie M. Roads.
2070. *Cosmos bipinnatus* Cav. Cosmos. Edge of wood near Buchanan, Pike Co. Katie M. Roads.
2079. *Bidens frondosa* L. Black Beggar-ticks. Lake Loramie, Shelby Co. Edward S. Thomas.
2118. *Chrysopsis mariana* (L.) Ell. Maryland Golden-aster. Friendship, Scioto Co. Delzie Demaree. Henly, Scioto Co. Katie M. Roads.
2140. *Solidago riddellii* Frank. Riddell's Goldenrod. Marl bog on Mrs. Hugh McCoy Farm, Wayne Twp., Fayette Co. Edward S. Thomas and John H. Schaffner.
2143. *Bellis perennis* L. European Daisy. Common in a lawn. Athens, Athens Co. M. T. Vermillion.
2211.1. *Achillea ptarmica* L. Sneezewort Yarrow. Adventive in Columbus, Franklin Co. W. H. Camp.
2219. *Matricaria matricarioides* (Less.) Port. Rayless Chamomile. Perry Twp., Tuscarawas Co. Irma Nelson. From E. S. Thomas.
2223. *Artemisia ludoviciana* Nutt. Western Mugwort. A very large patch along the road. Farmer's Station, Clinton Co. Katie M. Roads.
2236. *Mesadenia reniformis* (Muhl.) Raf. Great Indian-plantain. Ft. Ancient, Warren Co. Edward S. Thomas.
2238. *Mesadenia tuberosa* (Nutt.) Britt. Tuberous Indian-plantain. Pleasant Run Bog, Berne Twp., Fairfield Co. W. H. Camp.
2259. *Centaurea maculosa* Lam. Spotted Star-thistle. Salem Twp., Meigs Co. Clyde H. Jones.
2267. *Hypochaeris radicata* L. Long-rooted Cat's-ear. A weed in lawn. Columbus, Franklin Co. Geo. McClure.
2282.1. *Hieracium floribundum* Wimm. and Grab. Smoothish Hawkweed. From Europe. Warren Twp., Trumbull Co. Almon N. Rood.
2285. *Hieracium greenii* Port. & Britt. Green's Hawkweed. Berne Twp., Fairfield Co. Robert Goslin.
2300. *Lactuca villosa* Jacq. Hairy-veined Blue Lettuce. Highland Co. Clara G. Weishaupt.

2306. *Lactuca sativa L.* Garden Lettuce. Liberty Twp., Highland Co. Katie M. Roads.
2307. *Lactuca saligna* L. Willow Lettuce. Buchtel, Athens Co. Len. Stephenson. Highland Co. Clara G. Weishaupt.

The following 12 grasses not on the Ohio State List are attributed to Ohio by A. S. Hitchcock in the Manual of Grasses of the United States, published in 1935 by the U. S. Department of Agriculture. These should be added to our catalog and an attempt made by collectors to obtain specimens for the State Herbarium.

329.1. *Bromus mollis* L. Soft Chess.
334.2. *Bromus latiglumis* (Shear) Hitchc. Broad-glumed Brome-grass.
347.1. *Glyceria borealis* (Nash) Batch. (*Panicularia borealis* Nash.) Northern Manna-grass.
360.1. *Poa palustris* L. Fowl Blue-grass.
362.1. *Poa wolfii* Scribn. Wolf's Spear-grass.
370.1. *Eragrostis poaeoides* Beauv. Low Love-grass.
404.1. *Agrostis tenuis* Sibth. Colonial Bent-grass.
419.1. *Muhlenbergia foliosa* (Roem. & Schult.) Trin. Leafy Muhlenbergia.
421.1. *Muhlenbergia cuspidata* (Torr.) Rydb. Plains Muhlenbergia.
445.1. *Elymus riparius* Wieg. River-bank Wild-rye.
450.1. *Hordeum pusillum* Nutt. Little Barley.
486.1. *Panicum barbulatum* Mx. Barbed Panic-grass.

PHYSIOLOGICAL DOMINANCE AS A FACTOR IN CILIARY COORDINATION IN THE PROTOZOA

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The hypothesis of a localized co-ordination center or "neuromotorium" in the Ciliata has been advanced by Sharp (10), *et seq.* without regard for the work of Verworn (1) and Jennings and Jamieson (2), who have maintained that provided sufficient cilia were present any piece of a ciliate could react as a whole organism. Obviously if such pieces are co-ordinated in themselves there can be no localized center for the animal as a whole.

The question of the behavior of pieces of ciliates has been reopened by Alverdes (3) and Worley (4). Their results would indicate that the more posterior pieces are generally not able to react as the whole organism.

In an effort to clear up part of the situation at least the writer undertook a study of the reactions of pieces of *Spirostomum*. It was found that they are co-ordinated in inverse ratio to their distance from the anterior tip, and that the controlling factor is the amount of anterior material present (this control being especially concentrated in the first few microns of the anterior tip and fading rapidly posteriorly), but that *no definite area* is necessary. The co-ordinating ability therefore lies along the same axis as the metabolic gradient and is present to the same degree as is metabolic activity expressed in that gradient.

Alverdes' results (3) indicate the same condition in *Paramecium*, whereas Worley (4) in the same form suggests a localized "receptor center" on the surface of and anterior to the middle of the animal, in the area asserted by Rees (5) to contain a "neuromotorium." In the latest adjustment however of the Paramecium "neuromotorium" Lund (6) places it internally—aboral to the floor of the gullet and posterior to the position assigned by Rees. In this connection it should be noted that Taylor (7) in his microdissection study of *Euplotes* was not able to find any evidence of function of the alleged "neuromotorium" in that ciliate.

Observations made upon the membranelle series of *Stentor*

roeseli during binary fission by the present writer throw further light upon the question. The first evidence of division is the appearance of the new membranelles in a line down the side of the individual. They are totally unco-ordinated. As the new peristomial field develops and begins to project outwardly its membranelles still strike at random, while those of the anterior and older field show a trace of hindrance in their hitherto smoothly co-ordinated action. When the new field has grown to morphological equality with the older and lies in the same plane so that the dividing organism appears to be twinned, *both* membranelle series become co-ordinated and unco-ordinated irregularly, showing obvious lack of control. However, now as the older peristome following the normal course of fission in *Stentor* proceeds to grow on anteriorly from the newer, it *regains its co-ordination*, but the posterior field *relapses into unco-ordination*. This status obtains until division is nearly completed, when the anterior daughter is attached to the posterior merely by a thin stalk, (as the animal normally attaches to the substrate), at which time the posterior daughter slowly establishes co-ordination. This becomes complete just before the moment of separation. Bishop (8) has observed that the membranelles of the posterior daughter in the division of *Spirostomum* are unco-ordinated and the writer finds that they remain so for about a second after the completion of division, whereupon they suddenly "snap" into perfect action.

There seems to obtain, then, in the vegetative individual a condition where the more active end maintains ciliary co-ordination, whereas in fission where really two organisms are concerned the second individual is unable to set up its own co-ordination until freed from the domination of the first. There is therefore definitely an *anterior-posterior differential* in behavior in the ciliates discussed and the writer wishes to propose the theory that physiological dominance in the sense used by Child and his school is in some way an important if not the controlling factor in ciliary co-ordination in such forms.

Gray (9) quotes electrical experiments on metazoan ciliated tissue in which ciliary action is inhibited or enhanced by the electric current depending upon its direction of flow. This indicates the influence of dominance and the writer has experiments along that line in progress.

Further analysis of the subjects discussed in this paper will be available for subsequent publication.

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Genetics of Garden Plants

It is of the utmost importance to have available volumes in which the genetics of economic groups is compiled in usable form. Jull has already done this for poultry, and now Crane and Lawrence of the John Innes Horticultural Institution have brought together the material on horticultural plants. The resulting book is an excellent compendium of our knowledge of Mendelian inheritance and chromosomal abberations in a long list of species. An opening chapter on the genetics of diploid plants illustrates the basic principles of heredity, and presents interesting cases of the interactions of genes. This is followed by two chapters on the cytology of diploid plants and polyploid plants, respectively. The genetics of individual species is then taken up. Flowering and ornamental plants, vegetable and salad plants, and fruits, are all considered in detail. An especially fine feature is the series of tables giving the genetic constitution of the various varieties of each species. Bud sports and other variations comprise one chapter, and incompatibility and sterility are each given a chapter. The book closes with an informative section on the origin and development of new and improved forms. A glossary, a bibliography and an index complete the volume. The thanks of all geneticists will be forthcoming to the authors and publishers for making this valuable addition to available genetic information.—L. H. S.

The Genetics of Garden Plants, by M. B. Crane and W. J. C. Lawrence. xvi+236 pp. London, Macmillan & Co., 1934.

Amebiasis

This monograph of amebiasis, the first in the field for many years, will definitely strengthen any medical library to which it may find its way. American physicians are notoriously deficient, both in the fundamental aspects and practical handling of protozoan diseases. This volume fills a gap in the contemporary literature of the monograph type relating to this class of disorders, and should be in the possession of every internist.

The various chapters, including etiology, epidemiology and symptomatology, are well balanced in quality and volume of discussion. Especially valuable are the 40 pages in which the parasitic ameba, other than Endamebia histolytica, and the technique of laboratory examinations are discussed. The chapters on pathology are perhaps too prolix and could be easily condensed without loss. One expects a somewhat more complete discussion of the Chicago epidemic, not only because of its importance epidemiologically, but also because of the apparent temporizing measures adopted by local authorities which the author, as a member of the investigating committee, should either condemn or justify to his readers.

Bibliographies, illustrations and indexing, often neglected, are adequate and add greatly to the value of the publication. The constant repetition of 'amebiasis and amebic dysentery' is unworthy of the volume and an unfortunate and unwarranted gesture to the presumed ignorance of the general practitioner.

However, considered in its entirety, the author has made a very worth-while contribution and the volume deserves a wide circulation.—B. K. Wiseman.

Amebiasis and Amebic Dysentery, by Charles F. Craig. 315 pages. Springfield, Ill., Charles C. Thomas, 1934. $5.00.